THE IMPACT OF VOLATILE ORGANIC COMPOUND (VOC) REGULATIONS ON SHIPBUILDING AND SHIP REPAIR

TASK 3-84-5

SUBMITTED TO: MR. LYN HAUMSCHILT

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"SURFACE PREPARATION AND COATINGS"

NATIONAL STEEL AND SHIPBUILDING COMPANY

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FORWARD

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The Maritime Administration under its National Shipbuilding Research Program sponsored this study. National Steel and Shipbuilding Company, administered the program for the Maritime Administration with Mr. James Ruecker, formerly of National Steel and Shipbuilding Company, acting as the Technical Administrator. The work was performed by Mr. Hugh E. Peck, an independant consultant.

This study investigated the impact of two new volatile organic compound (VOC) regulations on the U.S. Shipbuilding industry. These new regulations, the first aimed specifically at the protective. coating of ships and other marine structures, have potentially widespread effects on many facets of the industry including raw material suppliers and coatings manufacturerers as well as end users.

EXECUTIVE SUMMARY

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The U.S. Shipbuilding Industry in its struggle to survive, faces a new challenge in selected areas of California as a result of the issuance of new regulations governing the application of protective coatings to ships and other marine structures. Since many other areas of the country where shipbuilding or ship repair activities are concentrated are also classed as "non-attainment" areas, the requirements of these new regulations in one form or another, are likely to become adopted forcing the requirements of meeting lower volatile organic compound (VOC) emissions to these other areas

Certainly suppliers and manufacturers will be forced to produce products meeting these requirements. While many suppliers have forseen this legislation or have produced products for other industries in low VOC versions, there are still products that will require redevelopment. Additionally, these regulations have a tradition of becoming more stringent in future years and may require new technologies or elimination of some products to be successfully implemented.

This report explains to shipbuilders and ship repair yards the impetus behind development of these regulations, provides a table showing where the regulations are similar and where they differ in their requirements and includes a section showing some coatings manufacturer’s products which meet these requirements.

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CONCLUSION

American shipyardS, both new construction and repair, will be challenged in the future to provide corrosion protection for marine structures by using only volatile organic compound containing coatings which meet stringent new environmental regulations. These regulations, promulgated in localities in California limit the amount of organic volatiles in coatings as they are applied. While some manufacturers produce product lines which meet many of the new requirements, some products will be eliminated from use and some new technologies will be required, either in application techniques or formulation, as the allowable VOC content is reduced in future years. The prudent shipyard must be intimately aware of these requirements and make preparations for both the current and impending requirements.

DISCUSSION

American Shipyards and the Marine Coatings Industry (Paint Companies, Solvent manufacturers, Resin suppliers, formulators, etc.) realized the criticality of air pollution and its repercussions when in the early 1960's California began legislating regulations to control emissions of various air pollutants. The first regional agency dealing with air pollution was established in 1955 as the Bay Area Air Pollution Control District which later became the Bay Area Air Quality Management District. In 1961 a program was begun in California to control auto exhaust emissions. This remains one of California's major control standards because of its unusual meterological properties and geography plus the fact that there are more cars per capita than any other state. California continues to set the pace for auto emissions controls even though the Air Quality Act of 1967 moved the responsibility for control of auto emissions to the Federal Government.

Air pollution is caused by both natural occurances and by modern industrial society. Volcanoes spurt cinder and ash into the air, dust storms, salt spray and lightening ignited forest fires have contributed to air pollution since the beginning of time. These effects have generally been counter-balanced in nature by agglomeration, settling, and rain cleansing in the atmosphere.

With the advent of modernization the counter-balance has been destroyed because of campfires, fireplaces, automobiles, manufacturing emissions, fuel burning for power generation, etc., that have played a major part in contributing to atmospheric particulate matter, atmospheric gases, and photochmical smong.

While painting operations in shipyards contribute to many types of pollution, the early concentration of legislative controls for painting operations was on the emission of photochemically reactive organic compounds into the atmosphere. On July 28, 1966 the Los Angeles County Air Pollution Control District enacted Rule 66 to control emission of photochemically reactive organic compounds. Rule 66 was intended to reduce smog and eye irritation in the Los Angeles County Area. This regulation controlled the emissions of certain organic solvents which, due to their reactivity, formed aldehydes and ozone in the presence of ultraviolet radiation in the atmosphere. These products produced in this reaction, collectively referred to as smog, cause eye irritation, respiratory concerns, and even potential weather pattern changes (Greenhouse Effect).

The protective coatings industry began an immediate flurry of activity to reformulate products to meet the requirements of this new regulation since a wide variety of the commonly used paint solvents and thinners were now limited in their concentrations in these coatings. This rule defined photochemically reactive organic solvents, including any dilutents or thinners, as any solvent with an aggregate of more than 20% of its total volume composed of three categories. These three categories also had specific limitations on composition quantities:

: No more than 5% of hydrocarbons, alcohols, aldehydes, esters, ethers, or ketones that have olefinic or cycloolefinic unsaturation.

: No more than 8% of aromatic compounds with eight or more carbon atoms except ethylbenzene.

: No more than 20% of ethylbenzene, toluene, branched-chain ketone or trichlorethylene.

This regulation restricted the use of some of the most common and most effective paint solvents such as methyl isobutyl ketone, xylene, toluene, and some mineral spirits. These were some of the better solvents for epoxies, vinyls and other coatings which required fast solvent release for film build, drying characteristics, water resistance, etc. Although this regulation specifically applied to architectural coatings used for residential and commercial buildings and their appurtenances or industrial buildings, the trend had been established. Much argument and debate occured as to whether marine coatings applications were subject to, this regulation. Because this trend had been established many other states and localities began promulgating regulations controlling solvent emissions and the marine coatings industry conceded that compliance was necessary. Many shipyards began requiring supplier to furnish products meeting the requirements of Rule 66 since other state and local plans were patterned after that regulation. Marine paint suppliers began furnishing products that could be formulated into Rule 66 "Exempt" versions. In some cases these were slower drying with less film build and greater solvent retention and the industry took some time to adjust to these changes. The U.S. Navy began to issue specification changes which included Rule 66 “exmpt" versions for use in areas of the country where solvent regulations existed.

Because some of these "exempt" versions of marine coatings were manufactured in certain locations of the country, economics and supply began to become a factor to shipyards. Because all localities were not subject to this type of regulation some shipyards had a competitive advantage by not using "exempt" solvents. In general "exempt" versions were more difficult to obtain, some formulations were not available, cost per gallon and cost for shipping was usually higher. These factors continued to contribute controversy in the marine coatings industry. These regulations caused paint companies selling in these areas particular difficulty since many of them manufactured marine, industrial and architectural coatings at the same facility.

On January 4, 1967, the Bay Area Air Pollution Control District (San Francisco) passed" Regulation 3. This regulation differed from Rule 66 in that it did not restrict branched chain ketones or trichloroethylene and was less restrictive on aromatic solvents. There were other differences in definition but coatings/solvents meeting the requirements of Rule 66 would also comply with Regulation 3.

Several other local rules and regulations followed which added to confusion in the industry. Rule 442 on the Usage of Solvents, Rule 1107 on the coating of Metal Parts and Products, Regulation 8, Rule 4 on General Solvent and Surface Coating Operations, Regulation 8 Rule 19 on Surface Coating of Miscellaneous Metal Parts and Products, Proposed Rule 1106 on Marine Coating Operations, and Regulation 8, Rule 43 on Surface Coating of Marine Vessels are examples.

In addition to the compendium of RuleS and Regulations, local jurisdictions began holding workshops to amend, change definitions, and alter exemptions so that the industry had difficulty maintaining a knowledge of requirements as well as meeting imposed deadlines for compliance.

The Federal Government began a major involvement when the Federal Clean Air Act of 1967 was passed. With the amendments of 1970 and 1977, the Environmental Protection Agency (EPA) was directed to require each state to prepare a State implementation Plan (SIP) to meet ambient air quality standards. These air quality standards set limits on a time weighted basis for such air pollutants as ozone, carbon monoxide, sulfur dioxide and others. The 1977 amendment to the Clean Air Act required all states to revise their state implementation plans (SXP) for areas that had not attained the National Ambient Air Quality Standard for Ozone. In most cases the requirement for compliance with the National Ambient Air Quality Standard for ozone was by December 31, 1982. In some circumstances this was extended to December 31, 1987. The State Implementation Plans had to contain controls for volatile Organic compound emissions from stationary sources for attaining the requirements of the standard. The result of this legislation is that many states issued VOC regulations for the control of emissions from coating applications. In many states emission standards were not state wide. Instead they only applied in localities classed as non-attainment areas.

The shift from solvent composition type regulations (such as Rule 66) to VOC limiting regulations has precipitated another major effort by raw

material suppliers, coatings manufacturers and end users, i.e. , shipyards.

Some of the early regulations which governed solvent compositions actually increased the VOC emissions of some coatings because of formulation difficulties and decreasd solvency of some "exempt" solvents. This was particularly evident in comparing the VOC content of the "Rule 66 exempt" versus the "non-exempt" epoxy formulations of MIL-P-24441.

The passage of Rule 1106, Marine Coating Operations on November 4, 1988 and Regulation 8, Rule 43, Surface Coating of Marine Vessels, on November 23, 1988, despite ten years of comments, objections, and highlighting of potential problems and hardships for the maritime industry, has established a framework which will have widespread and long range effects on marine coatings operations. Prior to the passage of Rule 1106 by the South Coast Air Quality Management District and Rule 43 by the Bay Area Air Quality Management District, missions from marine coating operations were not limited on ships and components "intended for exposure to unprotected shipboard conditions". In early meetings and workshops with the South Coast and Bay Area Air Quality Management Districts, it was indicated that unprotected conditions were the ships exterior surface. It was pointed out that while these coatings are high performance materials which my cause some difficulty in getting low VOC versions that would be equally suitable, some of the interior (protected by their definition) spaces may require even more sophisticated coating systems. Interiors such as sewage tanks, ballast tanks, crude oil tanks, specialty cargo tanks, fire zone bulkheads, potable water tanks,

bilges, distilled water tanks, chain lockers, galleys, etc., require specialty coating systems which may be extremely difficult to formulate into VOC compliant materials. Even if VOC compliant versions can be achieved, it may require much research and testing to prove performance for service aboard ship. Aside from their critical service requirements and extreme cost for renewal in the event of failure, these coatings can be susceptible to degreasers, scouring agents, detergents, salt spray, high humidity, tamkperature extremes, solvents, lubricants, chemicals, deionized water, fuels and a host of other harsh treatments including abrasion and impact. Some of these coatings could have been classified as extreme performance coatings which would have been exempted by Regulation 8, Rule 43.

With the first two marine coating regulations adopted, it is likely that more will follow shortly. In fact, San Diego has a similar regulation in progress and other major shipbuilding areas of the country designated as non-attainment areas are likely to consider similar regulations.

Marine Coating Regulations

Ships are large complex objects to coat effectively. They consist of many individual components mostly made of various grades of steels and other metals placed into a superb electrolyte (seawater). Because of their complexity and exposure, they require the use of highly sophisticated coating systems to protect valuable components, maintain readiness, prevent destructive corrosion and retain appearance. Through the years many coating systems have been developed to provide the protective qualities essential for long term service

under the complexity of situations and exposures in a ships lifespan. Very specific coatings have been developed to meet the rigorous demands of these environments which have proven themselves through elaborate testing and service trials.

Highly protective films are an absolute vital part of the ship construction and refurbishment process to guard against corrosive environments and to prevent biological fouling of ship bottoms. The latter governing ships speed and fuel consumption, the former governing docking cycles and maintenance costs.

For protection against these numerous environments and exposures in a ships life, a wide variety of specialty coating materials have evolved each with a particular volume solids and corresponding volatiles emission.

VOC emissions can range between 100% for cleaning solvents to 0% for some water borne coatings or 100% solids products. The volatile solvents or additives within a coating formulation evaporate into the atmosphere as a coating dries and cures. The largest portion evaporates within the first few minutes to hours after application while residual solvents may evaporate several hours or even days after application.

Selection of solvents for coatings by paint formulators is based by careful balance of volubility parameters, evaporation rates, and general compatibility with the resins involved. The coatings are formulated or selected based on location of the shipyard (local weather conditions) techniques to be used for application, time of year of application, surface and condition of surface to be coated, service requirements and life expectancy. With so many factors determining coatting use and so much capital involved if failures occur, changing coating

selection is very difficult and risky.

With the requirement to meet VOC regulations, and reduce emissions, the impetus is in place to require such changes. While some manufacturers have forseen these requirements, not all coating materials will be made available in formulations to meet these/r new equirements. Some products will be eliminated from use because the technology does not exist to produce them in the low VOC formulations required. Even though the regulations passed to date are very local and will probably only affect shipbuilding non-attainment areas in the future, the reduction of air pollutants should be a concern to all citizens. Air pollution reduces visibility, affects the life of some materials, causes plant damage, and contributes to health and respiratory problems. The evaporation of organic compounds produces hydrocarbons that react with nitrogen oxides in the presence of sunlight to produce smog and its major constituent ozone. This increase in Ozone in the atmosphere contributes to the "greenhouse effect" which is affecting weather patterns in some areas. For this reason, the Federal Government has taken some steps through the Environmental Protection Agency to control emissions, but, the major controls are On state and local levels.

Suppliers have the problem of meeting different requirements in different areas but have generally taken the approach of meeting the most stringent requirements if possible even though the cost may be higher. With the original composition type regulations (Rule 66) many suppliers stocked "exempt" and

"non-exempt" products since the cost differential could be substantial between the two. With VOC limiting type regulations, many of the lower VOC coatings have a much higher cost per gallon but the applied cost per mil square foot may be the same or in some cases may actually be lower.

These new regulations may have the affect of forcing new technology in some areas. Alternative synthetic resin development for protective coatings is one area currently being explored but where new products will be required. Relatively low molecular weight resins are needed to maintain viscosities at levels required with current application techniques without reduction by solvent. Alternatively, shipyards and other applicators will be forced to use equipment with higher pressures. For example, 45:1 and 60:1 airless pumps may be required instead of 30:1 pumps. Or, new developments in high solids, hot spray products may produce some answers. Duel component instant cure products with little or no VOC will require more sophisticated application techniques and training but will be forthcoming. Powder coatings are finding more usage particularly on components and will continue to increase in use as regulations are enforced.

Capture and recycling of cleaning solvents is a very practical way of reducing emissions which can produce a cost savings to the shipyard as well. Most paint shops have safety vats of solvents for cleanup of brushes. These recycled solvents are good to use in these and for other equipment cleanup. Explosion proof units are available that can be used to distill clean solvent from spent solvent collected into 55 gallon drums. Collecting and evaporation minimization of this cleanup solvent is a requirement of both Regulation 8, Rule 43

and Rule 1106 at this time.

Early rules such as "Regulation 8, Rule 19 allowed credit for improving the transfer efficiency, of coating applications; provided it could be demonstrated that efficiency was greater than 85%. This could be used in calculations to meet an alternative compliance plan. However, Regulation 8, Rule 43 does not allow this. The Marine regulation specifies that "the use of improved transfer efficiency shall not be used to demonstrate compliance as an alternative means of control". This regulation does allow compliance through the use of an alternative emissions control plan which has been approved by the Air Pollution Control Off ice in writing. This alternative plan allows calculation of VOC on a daily weighted average of pounds of VOC per gallon of solids with limits of 340 gmams/liter (2.8 pounds/gallon) for air dried coatings or 275 grams/liter (2.3 pounds/gallon) for baked coatings, or other limits as specified in 8-43-302 for specialty coatings. In order to use this alternative emissions plan it must be approved by the Air Pollution Control Office on an annual basis and must demonstrate the lack of availability of a complying coating. It also requires elaborate record keeping on a daily basis and will be extremely difficult for shipyards to use as a control plan.

Regulation 8, me 19 allowed credit for over compliance to be used on a pound for pound basis to offset emissions from coating operations that, on a daily weighted average, would be in excess of the requirements. Regulation 8,

Rule 43 for Marine Coatings does not allow this credit. Basically, there are two ways to meet this new marine coating regulation. One is by using only coatings which comply with the VOC limitations established. The other method is by the use of an air pollution abatement device approved by the Air Pollution Control Office which controls emissions to the atmosphere to an equivalent level (pounds VOC per gallon of solids) as specified in 8-43-301 and 8-43-302.

Clearly, for shipyards, this means that unless components or parts are coated within a containment area where an approved air pollution control device can be installed and shown to reduce emissions to the requirements, the only alternative is the use of coatings which comply with the regulation limits. This places the impetus for meeting these requirements mainly on suppliers since it will be a violation to require for use or to specify the application of any coating not complying with this rule.

REQUIREMENTS COMPARISON

GENERAL LIMITATIONS

Requirements Comparison - General Limitations

Reg. 8, Rule 43

8-43-301 Limits: Effective September 1, 1989, except as otherwise provided by this Rule, a person shall not apply to any marine vessel, component or structure intended for exposure to a marine environment any coating with a VOC centent in excess of the following limits, expressed as grams of VOC per liter of coating applied, excluding water, unless emissions to the atmosphere are controlled to an equivalent level (pounds VOC per gallon of solids) by an air pollution abatement device approved by the APCO.

301.1 Baked Coatings: 275 gins/liter (2.3 pounds/gallon)

301.2 Air Dried Coatings: 340 gins/liter (2.8 pounds/gallon)

Rule 1106

(b) Requirements

(1) Except as otherwise provided in this rule, a person shall not apply a marine coating with a VOC content in excess of the following limits expressed as grams of VOC per liter of coating applied, less water and less exempt solvents:

	After Sept. 1, 1989	After Sept. 1, 1991
Baked Coatings	360 gms/liter (2.9 pounds/gallon)	275 gins/liter (2.3 pounds/gallon)
Air Dried Single Component Alkyd or Vinyl Flat or Semi-Gloss Coatings	420 gins/liter (3.5 pounds/gallon)	340 gins/liter (2.8 pounds/gallon)
Two Component Coatings	340 gins/liter (2.8 pounds/gallon)	340 gms/liter (2.8 pounds/gallon)

There are some obvious differences in these general requirements of Reg. 8, Rule 43 and Rule 1106. Reg. 8 Rule 43 has a 275 gms/liter requirement for baked coatings in 1989 whereas Rule 1106 allows 360 gms/liter until 1991 when it is reduced to 275 gins/liter.

Reg. 8, Rule 43 has a 340 gins/liter requirement for air dried coatings in 1989 whereas Rule 1106 breaks this requirement into separate categories. For two component coatings it is the same (340 gins/liter). The only air dried single component coatings covered under 1106 general requirements is for single component alkyd or vinyl flat or semi-gloss coatings. This requirement is 420 gins/liter in 1989 and is reduced to a limit of 340 gms liter in 1991.

For new construction or repair shipyards these are important differences since chlorinated rubber and bituminous coatings would be eliminated from use by 301.2 in Reg. 8, Rule 43 (above 340 gins/liter) but not by Rule 1106. However, these coatings would be allowed for ship repair and maintenance with some reservations. Under Reg. 8, Rule 43, they would be allowed for the partial recoating of in-use non-U. S. Navy vessels over existing thermoplastic coatings only and provided VOC levels do not exceed 650 gms/liter on 9/1/89, 550 gins/liter on 9/1/91 or 340 gins/liter on 9/1/94, Rule 1106 does not limit the application to non-U.S. Navy ships nor does it limit application only over existing thermoplastic coatings. However, Rule 1106 has VOC limits of 650 gins/liter on 9/1/89 and 550 gins/liter on 9/1/91.

These cliff erences in definition and requirements will obviously lead to much confusion for those affected by these regulations.

REQUIREMENTS COMPARISON

SPECIALTY COATING

REQUIREMENTS COMPARISON - SPECIALTY COATING

Coating Type	Reg. 8, Rule 43								Rule 1106					
	9/1/89		9/1/91		9/1/92		9/1/94		9/1/89		9/1/91		9/1/92	
	Baked	Air Dried	Baked	Air Dried	Baked	Air Dried	Baked	Air Dried	Baked	Air Dried	Baked	Air Dried	Baked	Air Dried
Antifoulant		440				400				440				400
Heat Resistant	445	520	360	420			360	420	445	520	360	420		
High Gloss	360	420	275	340			275	340	360	420			275	340
High Temperature		650		500				500		650		500		
Inorganic Zinc		650		650				340		650		650		
Navigational Aids		550		550				550		550		340		
Pretreatment Wash Primer		780		780				420	780	780	780	780		
Undersea Weapons Systems	460	550	275	340			275	340	360	420	275	340		
Military Exterior Topcoat		420		340				340	No Catagory					
Specialty Interior		420		340				340	No Catagory					
Sealant Coat for Wire Sprayed Aluminum		610		610				610		610		610		
Special Marking		490		490				490		490		490		
Tack Coat		610		610				610		610		610		
Repair and Maintenance Thermoplastic		650		550				340		650		550		
Extreme High Gloss	420	490	420	490			420	490	420	490	420	490		
Low Activation Interior Coating		490		420				420		490		420		
Metallic Heat Resistant	No Catagory									530		530		
Elastomeric Adhesives with 15% by wt. Natural or Synthetic Rubber										730		730		
Antenna Coating	No Catagory									680		530		

There are some differences in these specialty coating limits which will affect shipyards, paint suppliers, the U.S. Navy, and raw materials suppliers.

The reduction of VOC maximums for inorganic zinc to 340 gins/liter in 1994 by Reg. 8, Rule 43 is a technology forcing regulation which will require much research and may not at all be possible with solvent based inorganic zincs.

Rule 1106 reduces the limit of Navigational Aids Coatings to 340 gins/liter in 1991 while Reg. 8, Rule 43 allows 550 gins/liter through 1994.

Another technology forcing regulation is the reduction of the pretreatment wash primer Ilimit to 420 gms/liter by 1994 under Reg. 8, Rule 43.

The U.S. Navy obviously has to be concerned about the inconsistency in the limits for undersea weapons systems and in what locality these systams may be coated.

Repair and maintenance thermoplastic coating limits of 340 gins/liter in 1994 will probably eliminate their use under Reg. 8, Rule 43 unless technology develops new products.

One of the major areas that both new construction and repair yards (but especially new construction) must be concerned about is preconstruction or holding primers. These are usually thin film (0.75 - 1.25 roils) coatings applied to protect steel from corrosion and pitting during storage and construction. Since neither of these regulations address these primers as specialty coatings as written, they are currently covered under the general catagory limits

and will not be allowed for use since they typically have very high VOC content.

REGULATION 8

ORGANIC COMPOUNDS

RULE 43 - SURFACE COATING

OF MARINE VESSELS

Regulation 8 - Organic Compounds

Rule 43 - Surface Coating of Marine Vessels

Adopted 11/23/88

Bay Area Air Quality Management District

8-43-100 GENERAL

8-43-101 Description: The purpose of this Rule is to limit the emission of volatile organic compounds from the surface coating of marine vessels, components and structures intended for exposure to a marine environment, including oil drilling platforms and navigational aids.

8-43-110 Exemption, Pleasure Craft and Fishing Vessels: The provisions of this Rule shall not apply to the coating of pleasure craft or commercial fishing vessels using coatings purchased in containers of one gallon or less.

8-43-111 Exemption, Low Usage Coatings: The requirements of Section 8-43-301 and 302 shall not apply to any coating used in volumes less than 75.7 1 (20 gal) in any one calendar year provided the requirements of Section 8-43-401 are satisfied.

8-43-112 Exemption, Aerosol Cans: The provisions of this Rule shall not apply to coating operations employing hand held aerosol cans.

8-43-113 Exemption, Solid Film Lubricant: The provisions of this Rule shall not apply to any solid film lubricant.

8-43-114 Exemption, Touch-up: The provisions of this Rule shall not apply to Touch-up operations.

8-43-115 Exemption, Aircraft and Aerospace Vehicles: The provisions of this Rule shall not apply to the coating of aircraft and aerospace vehicles subject to Rule 29 of Reg. 8.

8-43-116 Exemption, Architectural Coatings: The provisions of this Rule shall not apply to bridges, piers or other stationary structures which require architectural coatings subject to Rule 3 of Regulation 8, except where baked coatings are applied.

8-43-117 Exmption, Aluminum Hull Coatings: The provisions of this Rule shall not apply to antifoulant coating used on aluminum hulls provided records are maintained in Section 8-43-501.

8-43-118 Exemption, Vessels Coated Subject to Coastwide Bid Until September 1, 1994, the provisions of Section 8-43-301 and 302 shall not apply to the surface coating of any commercial vessel where the vessel owner has put the repair and coating contract for the vessel out for bid on the west coast of the United States outside of California, provided compliance with the provisions of Section 8-43-301 and 302 would result in the loss of the contract and provisions of Sections 8-43-402 and 501 are satisfied.

8-43-200 DEFINITIONS

8-43-201 Air Dried Coating: Any coating which is not heated above 90°C (194°F) for the purpose of curing or drying.

8-43-202 Baked Coating: Any coating which is cured or dried in an oven where the oven air temperature exceeds 90°C (194°F).

8-43-203 Coating Operation: The sum of all steps involved in the application, drying and/or curing of surface coatings.

8-43-204 Antifoulant Coating: Any coating applied to the. underwater portion of a vessel to pravent or reduce the attachment of biological organisms and registered with the Environmental Protection Agency (EPA) as a pesticide.

8-43-205 Heat Resistant Coating: Any coating which during normal use must withstand temperatures of at least 80°C (175°F).

8-43-206 High Gloss Coating: Any coating which achieves at least 85% reflectance on a 60° meter when tested by ASTM Method D-523.

8-43-207 High Temperature Coating: Any coating which during normal use must withstand temperature of at least 426°C (800°F).

8-43-208 Inorganic Zinc Coating: A coating derived from zinc dust incorporated into an inorganic silicate binder for the express purpose of providing corrosion protection.

8-43-209 Navigational Aids: Buoys or other Coast Guard waterway markers. For the purposes of subsection 8-43-302.6, specialty coating limit applies only to the re-coating of in-use navigational aids done at the usage site to be returned immediately to the water.

8-43-210 Pleasure Craft: Privately owned vessels used for non-commercial purposes.

8-43-211 Pretreatment Wash Primer. Any coating which contains a minimum of 1/2% acid by weight applied directly to bare metal surfaces and is necessary to provide surface etching.

8-43-212 Small Business: A business which satisfies the following conditions:

212.1 Its principal office must be in California.

212.2 Its officers must live in California.

212.3 It must be independently owned and operated.

212.4 It must not be dominant in its field of operations.

212.5 It must not be an affiliate of non-small business.

212.6 If it is a non-manufacturer, it cannot employ over 25 persons nor can its annual receipts exceed 1 million dollars.

212.7 If it is a manufacturer, it cannot smploy over 50 persons nor can its annual receipts exeed 5 million dollars.

8-43-21.3 Solid Film Lubricant: Avery thin coating consisting of an organic binder system containing as its chief pigment material one or more of the following: molybdenum disulfide, graphite, polytetrafluoroethylene (PTFE) or other solids that act as a dry lubricant between meeting surfaces.

8-43-214 Touch-up: That portion of the coating operation which is incidental to the main coating process but necessary to cover minor imperfections or mechanical damage incurred prior to intended use.

8-43-215 Volatile Organic Compounds: Any organic compound (excluding methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate) which would be emitted during use, application, curing or drying of a solvent or surface coating.

215.1 For purposes of calculating VGC. content of a coating, any water or the following nonprecursor organic compounds shall not be considered to be part of the coating:

methylene chloride
1,1,1 trichloroethane
trichlorotrifluoroethane (CFC-113)
trichlorofluoromethane (CFC-11)
dichlorodifluoromethane (CFC-12)
dichlorotetrafluoroethane (CFC-l34) (CFC-114)
chloropetafluoroethane (CFC-115)
chlorodifluoromethane (CFC-22)
trifluoromethane (FC-23)

8-43-216 Undersea Weapons Syste: All components of a system weapons system that is launched or fired undersea.

8-43-217 Military Exterior Topcoat: An exterior topcoat applied to military vessels, including U.S. Coast Guard vessels subject to specified chemical, biological, and radiological wash-down requirements.

8-43-218 Specialty Interior Coating: An extreme performance coating used on interior surfaces aboard. ships which has the fire retardant properties and has a toxicity index of less than 0.03 in addition to existing military physical and performance requirements.

8-43-219 Wire Spray Aluminum: A process of applying a molten aluminum coating to a steel substrate using an oxy-fuel combustion spray gun.

8-43-220 Sealant Coat for Wire Spray Aluminum: A coating approximately one mil thick of epoxy thinned one for one with appropriate solvent.

8-43-221 Special Marking Coating: Coating used specifically for items such as flight decks, ships numbers and other demarcations for safety and other purposes.

8-43-222 Tack Coat: An epoxy coat up to two roils thick applied to allow adhesion to a subsequent. coating where the existing epoxy coating has aged beyond the time limit specified by the manufacturer for the application of the next coat.

8-43-223 Repair and Maintenance of Commercial Vessels: The partial recoating of in-use non-U.S. Navy vessels over existing thermoplastic coatings.

8-43-225 Extreme High Gloss Coating: Any coating which achieves at least 95% reflectance on a 600 meter where tested by ASTM Method D-523.

8-43-226 Low Activation Interior Coating: A special composition coating used in interior surfaces aboard ships to minimize the activation of pigments on painted surfaces within a radiation environment.

8-43-300 STANDARDS

8-43-301 Limits: Effective September 1, 1989, except as otherwise provided by this Rule, a person shall not apply to any marine vessel, component or structure intended for exposure to a marine environment any coating with a VOC content in excess of the following limits, expressed as grams of VOC per liter of coating applied, excluding water, unless emissions to the atmosphere are controlled to an equivalent level (pounds VOC per gallon of solids) by an air pollution abatement device approved by the APCO:

301.1 Baked Coatings: 275 grams/liter (2.3 pounds/gallon)
301.2 Air Dried Coatings: 340 grams/liter (2.8 pounds/gallon)

8-43-302 Specialty Coating Limits: A person shall not apply to any marine vessel, component or structure intended for exposure to a marine environment any specialty coating with a VOC content in excess of the following limits, expressed as grams of VOC per liter (pounds per gallon) of coating applied, excluding water, unless emissions to the atmosphere are controlled to an equivalent level (pounds VOC per gallon of solids) by an air pollution abatement device approved by the APCO:

		Effective Sept. 1, 1989		Effective Sept. 1, 1992	
		Baked	Air Dried	Baked	Air Dried
302.1	Anti-foulant		440 (3.7)		400 (3.3)

		Effective Sept. 1, 1989		Effective Sept. 1, 1991		Effective Sept. 1, 1994	
		Baked	Air Dried	Baked	Air Dried	Baked	Air Dried
302.2	Heat Resistant	445(3.7)	520(4.3)	360(3.0)	420(3.5)	360(3.0)	420(3.5)
302.3	High Gloss	360(3.0)	420(3.5)	275(2.3)	340(2.8)	275(2.3)	340(2.8)
302.4	High Temp,		650(5.4)		500(4.2)		500(4.2)
302.5	Inorganic Zinc		650(5.4)		650(5.4)		340(2.8)

		Effective Sept. 1, 1989		Effective Sept. 1, 1991		Effective Sept. 1, 199	
		Baked	Air Dried	Baked	Air Dried	Baked	Air Dried
302.6	Navigational Aids		550(4.6)		550(4.6)		550(4.6)
302.7	Pretreatment Wash Primer		780(6.5)		780(6.5)		420(3.5)
302.8	Undersea Weapons System	460(3.8)	550(4.6)	275(2.3)	340(2.8)	275(2.3)	340(2.8)
302.9	Military Exterior Topcoat		420(3.5)		340(2.8)		340(2.8)
302.10	Specialty Interior		420(3.5)		340(2.8)		340(2.8)
302.11	Sealant Coat for Wire Spray Aluminum		610(5.1)		610(5.1)		610(5.1)
302.12	Special Marking		490(4.1)		490(4.1)		490(4.1)
302.13	Tack Coat		610(5.1)		610(5.1)		610(5.1)
302.14	Repair and Maintenance Thermoplastic		650(5.4)		550(4.6)		340(2.8)
302.15	Extreme High Gloss	420(3.5)	490(4.1)	420(3.5)	490(4.1)	420(3.5)	490(4.1)
302.16	Low Activation Interior Coating		490(4.1)		420(3.5)		420(3.5)

8-43-303 Alternative Emission Control Plan: The requirements of Sections 8-43-301 and 302 shall not apply to any coating operation that complies with an alternative emission control plan which has been approved by the APCO in writing and which satisfies all the following conditions:

303.1 Emissions of volatile organic compounds shall be calculated as a daily weighted average of pounds VOC per gallon of solids. Emissions shall be no greater than that amount which would result if the affected coating operation complied with all the applicable requirements of Sections 8-43-301 and 302.

303.2 The plan shall be submitted in writing to the AQCO for review and approval on an annual basis.

303.3 The plan shall include a demonstration of the lack of availability of complying coating.

303.4 The plan shall include methods acceptable to the APCO fur demonstrating compliance with the plan on an average daily basis. Such demonstration shall include the following:

a. description of the vessel or components to be coated

b. type and amount of each coating to be applied

c. VOC content, solvent density and volume solids content of each coating as applied

d. detailed description of compensating reductions to be achieved for each non-complying product.

303.5 The information required in subsection 8-43 -303.4 shall be made available for inspection by the APCO on each production day and retained for one year.

303.6 The plan shall contain credit only for reductions achieved on coating operations subject to this Rule.

303.7 Failure to comply with any provision of an approved plan shall constitute a violation of this Rule.

303.8 The person submitting the plans shall retain such records for one year and submit such information on coating usage, coating composition, laboratory analysis, source tests, or other information as required by the APCO to determine compliance with the plan.

303.9 The plan shall not include credit for emission reductions required by other Rules of this Regulation or other regulations of this District.

303.10 If any District regulation is adopted or amended after the approval of the plan, which requires emission reductions which are included in the plan, a new plan shall be submitted which does not include credit for those reductions.

303.11 The use of an improved transfer efficiency shall not be used to demonstrate compliance as an alternative means of control.

8-43-304 Prohibition of Specification: No person shall require for use or specify the application of a coating subject to this Rule if such use or application results in a violation of any provision of this Rule. The prohibition of this Section shall apply to all written or oral contracts under the terms of which any coating is applied to any marine vessel, component or structure intended for exposure to a marine environment at any physical location within the District.

8-43-305 Compliance Statement Requirement: The manufacturer shall include a designation of VOC (as defined in Section 8-43-215) expressed in grams per liter or pounds per gallon on data sheets for all coatings which are offered for sale in the District to be used on marine vessels, components and structures intended for exposure to a marine environment.

8-43-306 Early Compliance: Coatings in compliance with the provisions of this Rule prior to the effective dates shall not be subject to the provisions of Regulation 8, Rule 4.

8-43-307 Small Business Provisions: The requirements of Sections 8-43-301 and 3O2 shall not apply to any coating operation of a small business for which the following conditions are satisfied:

307.1 The owner or operator of the coating operation has demonstrated to the satisfaction of the APCO that the materials and equipment required to comply with Sections 8-43-301 or 302 are not reasonably available considering economic impact and technical feasibility Such demonstration shall be repeated on an annual basis.

307.2 The owner or operator shall identify the lowest emission limits which are reasonably achievable for such coating operation and shall agree to comply with those limits.

307.3 The APCO has approved the proposed alternative limits.

307.4 Failure to comply with emission limits approved under subsection 8-43 -307.3 shall constitute a violation of the of the Rule.

307.5 If the APCO denies an application to comply with the provisions of Section 8-43-307, the applicant may appeal that denial to the Hearing Board.

8-43-320 Surface Preparation and Cleanup Solvent: The requirements of this section shall apply to any person using solvent for surface preparation or cleanup.

320.3 A. person shall use closed containers for the storage or disposal of cloth or paper used for solvent surface preparation and cleanup.

320.2 A person shall store fresh or spent solvent in closed containers.

320.3 A person shall not use organic compounds for the cleanup of spray equipment including paint lines unless equipment for collecting the cleaning compounds and minimizing its evaporation to the atmosphere is used.

8-43-400 ADMINISTRATIVE REQUIREMENTS

8-43-401 Low Usage Coatings Petitition: Any person seeking to satisfy the conditions of Section 8-43-111 shall comply with the following requirements:

401.1 The user or specifier shall petititon the APCO in writing that substitute complying coatings are not available.

401.2 If the APCO grants written approval, such petition will be repeated on an annual basis.

8-43-402 Vessels Subject to Coastwide Bid

Petition: Any person seeking to satisfy the conditions of 8-43-118 shall petition the APCO in writing. The petition shall provide proof of the following.

402.1 The contract for surface coating was let out for bid on the west coast of the United States outside of California.

402.2 The owner or operator of the coating operation has requested a deviation from the contract for the use of complying coatings and has had that request for deviation denied.

402.3 The non-complying coatings, VOC contents and amounts to be used shall be identified.

402.4 The petition shall be repeated for each vessel subject to the conditions of Section 8-43-118.

8-43-500 MONITORING AND RECORDS

8-43-501 Coating Records: Any person subject to Sections 8-43-301 and 302 shall comply with the following requirements:

501.1 A person shall maintain, or have available, a current list of coatings in use which provides all of the coating data necessary to evaluate compliance, including the following information as applicable:

a. coating, catalyst and reducer used

b. mix ratio of components used

c. VOC content of coating as applied

d. military specification of the component or area coated

e. type and amount of solvent used for cleanup and surface preparation

501.2 A person shall have available monthly records that provide the following information on a daily basis, as applicable:

a. coating and mix ratio of components in the coating used

b. quantity of each coating applied

c. identification of specialty coating limit category

d. oven temperature

501.3 Such records shall be retained and available for inspection by the APCO for the previous 24 month period.

8-43-502 Alternative Emission Control Plan Records: Any person subject to Section 8-43-303 shall comply with the provisions of Section 8-43-501, in addition to the elements already required in subjection 8-43-303.4.

502.1 Excess Reporting. Any record showing a violation of subsection 303.1 shall be reported by sending a copy of such record to the Enforcement Division of the District within 96 hours following the occurrence. Such report will include an explanation of the cause of the violation and the corrective action taken.

8-43-600 MANUAL OF PROCEDURES

8-43-601 Analysis of Samples: Samples of volatile organic compounds as specified in Sections 8-43-301 and 302 shall be analyzed as prescribed in the Manual of Procedures, Volume III, Method 21 or 22 or any other method deemed appropriate by the APCO.

601.1 Any person seeking to have samples analyzed by an alternate method shall petititon the APCO in writing including the reasons therfore. The APCO shall grant approval for an alternate method in writing.

8-43-602 Determination of Emissions: Emissions of volatile organic compounds as specified in Sections 8-43-301 and 302 and subsection 8-43 -303.4 shall remeasured as prescribed in the Manual of Procedures, Volume IV, ST-7.

RULE 1106

MARINE COATING OPERATIONS

Rule 1106

Marine Coating Operations

South Coast Air Quality Management District

(a) Definitions

For the purpose of this rule the following definitions shall apply:

(1) Air dried coating is any coating that is cured at a temperature below 90°c(194°F)

(2) Air Dried Single Component Alkyd or Vinyl Flat or Semigloss Coating is any maintenance coating having an alkyd or vinyl base which is a single component coating and is air dried.

(3) Antenna Coating is any coating applied to equipment and associated structural appurtenances which are used to receive or transmit electro-magnetic signals.

(4) Antifouling Coating is any coating applied to the underwater portion of a vessel to prevent or reduce the attachment of biological organisms and registered with the Environ-mental Protection Agency (EPA) as a pesticide.

(5) Baked Coating is any coating that is cured at a temperature at or above 90°C (1940F).

(6) Elastomeric Adhesive is any adhesive containing natural or synthetic rubber.

(7) Exempt Compounds are any of the following compounds: 1.1.1 trichloroethane, methylene chloride, trifluoromethane (FC-23), trichlorotrifluoroethane (CFC-113), dichlorodifluoromethane (CFC-12), trichlorofluoromethane (CFC-11), chlorodifluoromethane (CFC-22), dichlorotetrafluoroethane (CFC-114), and chloropentafluoroethane (CFC-115).

(8) Extreme High Gloss Coating is any coating which achieves at least 95 percent reflectance on a 60° meter when tested by ASTM Method D 523.

(9) Grams of VOC per liter of Coating. Less Water and Less Exempt Compounds is the weight of VOC per combined volume of VOC and coating solids and can be calculated by the following equation:

Grams of VOC per liter of Coating Less Water and Less Exempt Compounds

$$= \frac{W_s \quad W_w \quad W_{es}}{V_m \quad V_w \quad V_{es}}$$

Where W_s = weight of volatile compounds in grams

W_w = weight of water in grams

W_{es} = weight of exempt compounds in grams

V_m = volume of material in liters

V_w = volume of water in liters

V_{es} = volume of exempt compounds in liters

(10) Heat Resistant Coating is any coating which during normal use must withstand temperatures of at least 204°C (400°F).

(11) High Gloss Coating is any coating which achieves at least 85 percent reflectance on a 60° meter when tested by ASTM Method D-523.

(12) High Temperature Coating is any coating which must withstand temperatures of at least 426°C (800°F).

(13) Low Activation Interior Coating is a coating used on interior surfaces aboard ships to minimize the activation of pigments on painted surfaces within a radiation environment.

(14) Marine Coating is any coating, except unsaturated polyester resin (fiberglass) coatings, containing volatile organic materials and applied by brush, spray, roller or other means to ships, boats and their appurtenances, and to buoys and oil drilling rigs intended for the marine environment.

(15) Metallic Heat Resistant Coating is any coating which contains more than 5 grams of metal particles per liter as applied and which must withstand temperatures over 80°C(175°F).

(16) Navigational Aids are buoys or other Coast Guard waterway markars.

(17) Pretreatment wash primer is a coating which contains at least 1/2 percent acids, by weight, to provide surface etching and is applied directly to metal surfaces to provide corrosion resistance, adhesion and ease of stripping.

(18) Repair and Maintenance Thermoplastic Coating is a resin-bearing coating in which the resin becomes pliable with the application of heat such as vinyl, chlorinated rubber, or bituminous coatings.

(19) Sealant for wire sprayed aluminum is a coating of up to one mil (0.001 inch) in thickness of an epoxy material which is reduced for application with an equal part of an appropriate solvent (naphtha, or ethylene glycol monoethyl ether).

(20) Special Marking Coating is any coating used for items such as flight decks, ships numbers and other safety/identification applications.

(21) Tack Coat is an epoxy coating of up to two mils thick applied to an existing epoxy coating which has aged beyond the time limit specified by the manufacturer for application of the next coat.

(22) Touch-Up is a coating incidental to the main coating process but necessary to cover minor imperfections.

(23) Two Component Coating is a coating requiring the addition of a separate reactive resin, commonly known as a catalyst, before application to form an acceptable dry film.

(24) Undersea Weapons System is any or all components of a weapons system that is launched or fired underwater.

(25) Volatile Organic Compund (VOC) is any volatile compound of carbon, excluding methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate, and exempt compounds listed in subparagraph (a) (7).

(26) Wire sprayed Aluminum is a multi-aluminum coating applied to a steel substrate using oxygen fueled combustion spray methods.

(b) Requirements

(1) Except as otherwise provided in this rule, a person shall not apply a marine coating with a VOC content in excess of the following limits, expressed as grams of VOC per liter of coating applied, less water and less exempt solvents.

	After Sept. 1, 1989	After Sept. 1, 1991
Baked Coatings	360 grams/liter (2.9 lbs/gal)	275 grams/liter (2.8 lbs/gal)
Air Dried Single Component Alkyd or Vinyl Flat or Semi Gloss Coating	420 gins/liter (3.5 lbs/gal.)	340 gins/liter (2.8 lbs/gal.
Two Component Coatings	340 grins/liter	340 grams/liter

(2) Specialty Coating Limits

A person shall not apply a marine coating with a VOC content in excess of the following limits, expressed as grams of VOC per liter of coating applied, less water and less exempt solvents.

	Effective Sept. 1, 1989		Effective Sept. 1, 1991	
Coating Type	Baked	Air Dried	Baked	Air Dried
Heat Resistant	445	540	360	420
Metallic Heat Resistant		530		530
High Temp.		650		500
Pre treatment Wash Primer	780	780	780	780
Underwater Weapons System	360	420	275	340
Elastomeric Adhesives with 15% by weight Natural or Synthetic Rubber		730		730
Solvent based Inorganic Zinc		650		650

Navigational Aids		550		340
Sealant for wire sprayed aluminum		610		610
Special Marking		490		490
Tack Coat		610		610
Low Activation Interior Coating		490		420
Repair and Maintenance Thermoplastic		650		550
Extreme High Gloss Coating	420	490	420	490
Antenna Coating		680		530

	Effective Sept. 1, 1989		Effective Sept. 1, 1992	
Coating Type	Baked	Air Dried	Baked	Air Dried
Antifoulant		440		400
High Gloss	360	420	275	340

(3) Thinning and Diluting of Coatings

Coatings subject to the provisions of this rule may be thinned or diluted to suit atmospheric cond it ion’s of temperature and humidity in accordance with the coating manufacturers recommendations as stated by the manufacturer on the container label or in the shipping documentation. Any such thinning or diluting shall not cause the VOC content of a coating to exceed its applicable limit as stated in this rule. This requirement shall not apply to the thinning of marine coatings with water.

(4) Solvent including waste solvent shall not be stored or disposed of in such a manner as will cause or allow its evaporation into the atmosphere.

(c) Prohibition of Specification

(1) A person shall not solicit or require any other person to use in the District, any coating or combination of coatings to be applied to any marine vessel or marine component subject to the provisions of this rule that does not meet the limits and requirements of this rule, or of an Alternative Emission Control (AEC) Plan approved pursuant in the provisions of paragraph (f) of this rule.

(2) The requirements of this paragraph shall apply to all written or oral agreements executed or entered into after Nov. 4, 1988.

(d) Methods of Analysis

The VOC content of coatings subject to the provisions of this rule shall be determined by the procedures detailed in the District's "Laboratory Methods of Analysis for Enforcement Samples" manual.

(e) Control Device Equivalency

(1) The emission limits of paragraph (b) may be achieved by any other emission control process, such as incineration of adsorption, approved by the Executive Officer.

(2) The use of coatings with VOC contents in excess of the limits specified in pqragraph (b) shall be allowed provided the emissions of VOC to the atmosphere from the use of such coatings is reduced to a level which is equivalent to the use of coatings which comply with the limits of paragraph (b).

(f) Alternative Emission Control Plan

An owner/operator may achieve compliance with paragraph (b) by emissions averaging methods, provided the applicant submits an Alternative Emission Control Plan that is enforceable by the District on a daily basis and receives approval in writing from the Executive Officer prior to implementation. The Alternative mission Control Plan shall:

(1) Contain, as a minimum, all data, records, and other information necessary to determine eligibility for alternative emission control including, but not limited to:

(A) A list of equipment subject to alternative emission control, and

(B) Daily hours of utilization for applicable equipment and

(C) Estimated emission of VOC for each operation on a daily basis including cleanup and surface preparation.

(2) Present the methodology for estimation of equivalency of emission reductions under the proposed Alternative Emission Control Plan as compared to either the emission reductions required by the applicable rules or to actual emissions whichever is less.

(3) Demonstrate to the satisfaction of the Executive Officer that the difference between the emissions allowed by existing regulations and any lower actual emissions will not be used to increase missions from the same or another source.

(4) Demonstrate that the permit units subject to the specified rule emission limitations are in compliance with, or on an approved schedule for compliance with, all applicable District rules.

(5) Be Sumitted for approval of any subsequent update or revision prior-to modification of equipment subject to alternative emission control.

A violation of an approved plan shall be a violation of Rule 1106. Sources operating under an approved plan shall report all violations of the plan to the Executive Officer within 96 hours.

(g) Exemptions

The provisions of this rule shall not apply to:

(1) Marine coatings applied to interior surfaces of potable water containers

(2) Touch up Coatings

(3) Marine coatings purchased in containers of one quart or less and applied to pleasure craft

(4) Antifoulant coatings applied to aluminum hulls

(h) Effective Dates

(1) The operator of any marine coating operation subject to this rule shall comply with the provisions of this rule in accordance with the effective dates indicated in the requirements sections of this rule

(2) Until the effective dates indicated in the requirements section of this rule, the operator of any marine coating operation shall comply with the provisions of Rule 442 or this rule, but is not required to comply with both

(3) Any marine coating operation or facility which is exempt from all or a portion of this rule shall comply with the provisions of Rule 442.

COMMENTS

SIMILARITIES BETWEEN REGULATION 8,

RULE 43 AND RULE 1106

COMMENTS

Similarities

1. Reg. 8, Rule 43 and Rule 1106 both include ships (marine vessels) component oil drilling structures and navigational aids in their descriptions of marine coatings.

2. Reg. 8, Rule 43 exempts touch-up operations defined as that portion of the coating operation which is incidental to the main coating process but necessary to cover minor imperfections or mechanical damage incurred prior to intended use. Rule 1106 exempts touch-up coatings.

3. Reg. 8, Rule 43 exempts aircraft, aerospace, and architectural coatings covered by other rules. Rule 1106 only applies to marine coatings.

4. Neither rule applies to antifouling coatings used on aluminum hulls.

5. Definitions of air dried coatings are similar (90°C or below).

6. Definitions of baked coatings are similar (90°C or above).

7. Definitions of antifouling coatings are the same.

8. Definitions of high gloss coatings are the same.

9. Definitions of high temperature coatings are the same.

10. Definitions of pretreatment wash primer are basically the same.

11. Both Regulations exempt the same nine halogenated hydrocarbons.

12. Both regulations define volatile organic compounds the same way and exclude methane, CO, CO_2. carbonic acid, metallic carbides or carbonates and ammonium carbonate.

13. Both regulations exclude water in the calculation of VOC.

14. Both regulations define undersea weapons systems similarly.

15. Both regulations define wire sprayed aluminum and sealants for wire sprayed aluminum similarly.

16. Both regulations define special marking coatings similarly.

17. Both regulations define tack coats similarly.

18. Both regulations define thermoplastic coatings similarly.

19. Both regulations define extreme high gloss coatings the same way.

20. Both regulations define low activation interior coatings similarly.

21. Both regulations have effective dates of September 1, 1989.

22. Both regulations have provisions (with extensive requirements) for the use of an alternative emissions control plan. This plan must be submitted to the APCO and approved in writing prior to implementation or use as an alternative. Each regulation has very specific requirements. See 8-43-303 in Reg. 8, Rule 43, and (f) in 1106.

23. Both regulations prohibit the specification of coatings for marine use that do not comply with the provisions specified in the regulations whether written or oral contracts.

24. Both regulations require minimization of evaporation of cleanup solvents and do not allow thinning above VOC requirements.

25. Coatings not in compliance with Reg. 8, Rule 43 may be subject to Reg. 8, Rule 4 until effective dates. Coatings not in compliance with Rule 1106 or exempt from Rule 1106 are required to meet Rule 442 but not both.

26. Both regulations specify the methods of analysis.

COMMENTS

DIFFERENCES BETWEEN REGULATION 8,

RULE 43 AND RULE 1106

Differences

1. Rule 1106 does not include unsaturated polyester resin coatings (fiberglas).

2. Reg. 8, Rule 43 provides 1 gallon or less exemption for pleasure craft and commercial fishing vessels. Rule 1106 provides 1 quart or less exemption for pleasure craft only.

3. Reg. 8, Rule 43 provides an exemption for any coating used in volumes less than 20 gallons in one calendar year provided the conditions of 8-43-401 are met.

4. Reg. 8, Rule 43 exempts hand held aerosol cans. Rule 1106 does not.

5. Reg. 8, Rule 43 exempts solid film lubricants. Rule 1106 does not unless it contains no volatile organic materials.

6. Reg. 8, Rule 43 requires elaborate record keeping (8-43-501) for aluminum hull anti-fouling paint applications. Rule 1106 does not have this requirement even though it is wise for the shipyard to do S0.

7. Reg. 8, Rule 43 provides an exemption from the limits specified until September 1, 1994 for the surface coating of any commercial vessel where the owner has put the contract for repair and coating out for bid on the West Coast outside of California provided compliance with the limits would result in loss of the contract. The conditions of 8-43-402 and 8-43-501 must also be met.

8. Rule 1106 defines and limits the VOC content of Antenna Coatings. Reg. 8, Rule 43 does not define this class.

9. Reg. 8, Rule 43 defines heat resistant coatings as those which must withstand temperatures of at least 80°C (175°F) Rule 1106 defines these as coatings which must withstand at least 204°C (400°F).
10. Rule 1106 defines and limits the VOC content of metallic heat resistant coatings. Reg. 8, Rule 43 does not define the class.

11. Reg. 8, Rule 43 specialty coating limit for navigational aids applies only to recoating of in-use aids done at the site and returned immediately to the water. Rule 1106 applies to all navigational aid and buoys.

12. Reg. 8, Rule 43 allows special provisions for small business (8-43-307) provided it meets definition (8-43-212) Rule 1106 does not have provisions.

13. Reg. 8, Rule 43 defines and limits the VOC content of military exterior topcoats. Rule 1106 does not define this Class.

14. Reg. 8, Rule 43 defines and limits the VOC content of specialty interior fire retardant coatings. Rule 1106 does not define this class.

15. Reg. 8, Rule 43 defines repair and maintenance of Commercial vessels as the partial recoating of in-use non U.S. Navy vessels over existing thermoplastic coatings. Rule 1106 does not define repair and maintenance of commercial vessels independently.

16. Rule 1106 exempts marine coatings applied to the interior surfaces of potable water containers. Rule 8, Rule 43 does not.

17. Rule 1106 separates air dried single component alkyds and vinyl flat or semigloss from the air dried definition. Reg. 8, Rule 43 does not.

18. Rule 1106 separates two component coatings from baked coatings and from single component alkyds and vinyl flat or semi-gloss coatings and from other air dried coatings. Reg. 8, Rule 43 does not.

19. Rule llO6 prohibits specification of any coating not meeting its requirements after November 4, 1988 and is therefore currently in effect. Coatings not in early compliance with Reg. 8, Rule 43 may be subject to Reg. 8, Rule 4.

20. Reg. 8, Rule 43 requires manufacturers to list VOC on all data sheets; Rule 1106 does not.

21. Reg. 8, Rule 43 is more specific on guarding against evaporation of cleanup solvents; see 8-43-320 and (b)(4) in 1106.

22. Reg. 8, Rule 43 has elaborate record keeping requirement. See 8-43-501. Rule 1106 is not specific on records, but they should be maintained.

SURVEY RESULTS

Thirteen U.S. Marine Coatings manufacturers were requested to supply information on products which meet the requirements of Regulation 8, Rule 43. The results of this survey are included as general information for shipyard specifiers and/or purchasing agents responsible for acquiring products to use at their facility.

Several major marine coatings manufacturers did not respond to this survey. It is suggested that the specifier contact companies manufacturing the products intended for use to determine the VOC content of products. Alternatively, or if questionable a reliable coatings laboratory can determine the VOC content of coatings of foreign origin or of questionable products.

Mark E. Peck
Consulting Engineer
3213 Rocks Chrome Hill Road
Jarrettsville, MD 21084

31 January 1989

I am working on a project for the Society of Naval Architects and Marine Engineers that involves the transfer of information to U.S. Shipyards on ways to meet the requirements of the newly legislated Regulation 8, Rule 43, Surface Coating of Marine Vessels. This regulation was passed by the San Francisco Bay Area Air Quality Management District on November 23, 1988 and has strong potential impact on other non-attainment areas of California as well as other states.

I would appreciate any input you may be able to provide regarding products in all generic classes which meet the requirements of this regulation. Please list products by generic type indicating company designation, relative cost compared with non-complying product (% higher lower, etc.), availability (or reason product is not available, e.g., raw materials not available, market not sufficient, technology lacking, etc.), and history in marine service.

I would appreciate receiving this information by the last week of February, 1989 so that your input may be included in my report to be distributed to all shipyards and other interested parties.

I've enclosed a copy of this regulation for your use in the event that it is not available at your location.

Thanks very much for your cooperation in helping to provide this information to American Shipbuilders. If you have any questions, please call 301 - 557-7715.

Sincerely,

Mark E. Peck
Consulting Engineer

Enclosure

Generic Type	Company Designation	VOC Content*	Cost Relative to Non-Complying Solvents	Availability	History In Marine Service (Yes or No)

*Excludes Water, See Reg. 8, Rule 43

CARBOLINE COMPANY

350 HANLEY INDUSTRIAL CT.

ST. LOUIS, MO 63144-1599

Generic Type	Company Designation	Grams/liter VOC Content*	Cost Relative to Non-Complying Solvents	Availability	History In Marine Service (Yes or No)
Acrylic Latex	3300	40	Equal	Stock	No
Silicone Alkyd Heat Resistant	HM 21 Primer	444	"	"	"
Mod. Alkyd	GP-818	364	"	"	"
Med. Oil Alkyd	DTM 58	366	"	"	"
Epoxy Coal-Tar	Carbomastic 14	221	"	"	Yes
Epoxy - Mastic Aluminum filled	Carbomastic 15 Lo	88	"	"	Yes
Epoxy Coal-Tar	Carbomastic 18	166	"	"	No
Epoxy Mastic Aluminum filled	Carbomastic 90	84	"	"	No
Epoxy Urethane Mastic Aluminum Filled	Carbomastic 242	204	"	"	Yes
Epoxy - amine	187 HFP Primer	273	"	"	Yes
Epoxy - amine	187 HFP Finish	275	"	"	Yes

*Excludes Water, See Reg 8, Rule 43

Generic Type	Company Designation	Grams/liter VOC Content*	Cost Relative to Non-Complying Solvents	Availability	History In Marine Service (Yes or No)
Epoxy Polyamide	190 HB	327	EQual	Stock	Yes
Epoxy Polyamide	191 Primer	231	"	"	No
Epoxy Polyamide	191 Finish	246	"	"	"
Cross-linked epoxy	801	208	"	"	No
" " "	890	214	+30%	"	Yes
" " "	893	195	+30%	"	No.
" " "	893 RCP	320	+30%	"	No
Modified Silicone (hi-Temp)	4631	605	equal	"	Yes
Modified Silicone (hi-temp)	4674 Black	501	"	"	Yes
Modified Phenolic	373 Primer	207	"	"	Yes
" "	373 Finish	233	"	"	Yes

*Excludes Water, See Reg 8, Rule 43

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Generic Type	Company Designation	Grams/liter VOC Content*	Cost Relative to Non-Complying Solvents	Availability	History In Marine Service (Yes or No)
Modified Phenolic	376 Primer	209	equal	Stock	Yes
" "	376 Intermediate	209	"	"	"
" "	376 Finish	252	"	"	"
Flake-Glass Polyester	Carboglas 1678	48	"	"	"
Polyurethane Alkyd Copolymer (Hi-gloss)	139	400	"	"	"
Acrylic Aliphatic Polyurethane (Hi-gloss)	D834	300	+30%	"	"
"	D834 HS	210	+30%	"	"
Polyvinyl-Butyral Wash Primer	1037 WP	674	equal	"	"
Inorganic Zinc	Carbo Zinc 10	554	"	"	No
Inorganic Zinc Pre-Construction Primer	Carbo Weld 11	705	"	"	Yes
Inorganic Zinc	Carbo Zinc 11	515	"	"	Yes

*Excludes Water, See Reg 8, Rule 43

Generic Type	Company Designation	Grams/liter VOC Content*	Cost Relative to Non-Complying Solvents	Availability	History In Marine Service (Yes or No)
Inorganic Zinc	Carbo Zinc D11 HS	264	+30%	stock	No
Inorganic Zinc	Carbo Zinc 12	575	equal	"	Yes
Cross-linked epoxy Zinc filled	D858	303	"	"	No

*Excludes Water, See Reg 8, Rule 43

GENERIC TYPE: Single package, modified acrylic latex (contains fungicide).

GENERAL PROPERTIES: Carboline 3300 combines ease of application associated with water-based paints and exceptional appearance, film strength, weathering, and chemical resistance. This combination of desirable properties is unique for acrylic latex coatings. Absence of solvents is a safety factor during application and equipment can be cleaned with warm, soapy water. Carboline 3300 has good hiding ability, withstands chalking, and will maintain an attractive appearance. Recommended film build can be easily obtained in one coat.

RECOMMENDED USES: Carboline 3300 is an excellent topcoat applied directly over Carbo Zinc® or other inorganic zincs. It provides color, long lasting appearance and prevents premature zinc loss. Carboline 3300 bonds well to properly prepared cementitious surfaces such as concrete, stucco, drywall, gypsum board and plaster. Recommended with suitable primer for structural steel, equipment, and tank exteriors in most industries including chemical processing, petroleum, pulp and paper, water and sewage, etc. Consult Carboline Technical Service for specific environments.

NOT RECOMMENDED FOR: Immersion or exposure to severe chemicals.

CHEMICAL RESISTANCE GUIDE:

Exposure	Splash and Spillage	Fumes
Acids	Fair	Very Good
Alkalies	Fair	Very Good
Solvents	Poor	Good
Salt	Very Good	Excellent
Water	Very Good	Excellent

TEMPERATURE RESISTANCE: (non-immersion)
Continuous: 300°F (149°C)
Non-continuous: 350°F (177°C)

FLEXIBILITY: Excellent **WEATHERING:** Excellent

ABRASION RESISTANCE: Fair

SUBSTRATES: Steel: Apply to suitably primed steel.

Cementitious Surfaces: Apply to properly prepared surfaces such as concrete, plaster, cement board, stucco and drywall. Extremely rough surfaces may require a surfacer.

TOPCOAT REQUIRED: Normally none.

COMPATIBILITY WITH OTHER COATINGS: Can be applied over inorganic zincs, epoxy-coal tars, acrylics, epoxies, vinyls, and other latexes. Consult Carboline Technical Service for specific recommendations.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
Carboline 3300	39% ± 2%

RECOMMENDED DRY FILM THICKNESS PER COAT: 3 mils (75 microns)

THEORETICAL COVERAGE PER MIXED GALLON*:
626 mil sq. ft. (15.6 m^2/l at 25 microns)
209 sq. ft. at 3 mils (5.2 m^2/l at 75 microns)

***NOTE:** Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: 24 months minimum

NOTE: FREEZING MAY drastically affect shelf life or in extreme cases product performance.

COLORS: Available in a variety of colors. Consult your local Carboline representative or Carboline Customer Service for availability.

GLOSS: Low

Prices may be obtained from Carboline sales representative or main office.

APPROXIMATE SHIPPING WEIGHT:

	1 GAL.	5 GAL.
Carboline 3300	11.5 lbs. (5.2 kg)	55 lbs. (25.0 kg)

FLASH POINT: (Pensky-Martens Closed Cup)
Carboline 3300 – Greater than 205°F (96°C)

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SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in Carboline Thinner #2 or toluol in accordance with SSPC-SP 1.

Steel: Apply over clean, dry, recommended primers. Remove all dirt, oil, grease and contaminants. Aged Carbomastics or other coal-tar epoxies should be wiped with Carboline Surface Preparation # 1 or brush sandblasted.

Concrete: Concrete must be cured 28 days at 70°F (21°C) and 50% RH or equivalent. Check for incompatible release agents or curing compounds. Extremely rough or porous concrete may require a surfacer.

MIXING: Mix *to* smooth consistency with mechanical agitator such as "jiffy" mixer. Thin up to 12% by volume with clean, potable water, if required.

APPLICATION TEMPERATURES:

	Material	Surfaces
Normal	60-90°F (16-32°C)	65-85°F (18-29°C)
Minimum	45°F (7°C)	40°F (4°C)
Maximum	100°F (38°C)	165°F (74°C)

	Ambient	Humidity
Normal	65-90°F (18-32°C)	10-85%
Minimum	40°F (4°C)	0%
Maximum	120°F (49°C)	95%

Do not apply when the surface temperature is less than 5°F (2°C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use sufficient air volume for correct operation of equipment.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edges first, making an extra pass later.

NOTE: The following equipment has been found suitable, however, equivalent equipment may be substituted.

Conventional: Use a 3/8" minimum I.D. material hose. Hold gun approximately 12-14 inches from the surface and at a right angle to the surface.

Mfr. & Gun	Fluid Tip	Air Cap
Binks #18 or #62	63B	63PB
DeVilbiss P-MBC or JGA	FX	704
	approx. .043" I.D.	

Airless: Use a 3/8" minimum I.D. material hose. Hold gun approximately 18-20 inches from the surface and at a right angle to the surface.

Mfr. & Gun	Pump*
DeVilbiss JGB-507	QFA-519
Graco 205-591	President 30:1 or Bulldog 30:1
Binks Model 500	Mercury 5C

*Teflon packings are recommended and are available from pump manufacturer.

Use a .015-.019" tip with 1800 psi.

BRUSH: For small areas or touch-up only. Use natural bristle brush applying with full strokes. Avoid rebrushing.

ROLLER: Use a short nap mohair rollerwith phenolic core. Avoid rerolling. Two coats may be required for uniform hiding.

DRYING TIMES:

Between coats	Final cure
16 hours at 40°F (4°C)	14 hours at 75°F (24°C)
8 hours at 50°F (10°C)	7 hours at 90°F (32°C)
4 hours at 60°F (16°C)	
2 hours at 75°F (24°C)	
1 hour at 90°F (32°C)	

CLEAN UP: Use warm, soapy water. If material has dried or if solvent based caotings are to be used, use Carboline Thinner #2 or ketone.

STORAGE CONDITIONS:
Temperature: 40-110°F (4-43°C) Humidity: 0-100%

CAUTION: Do not ship at temperatures below 32°F (0°C).

CAUTION: WATER-BASED PRODUCT. KEEP FROM FREEZING. EMPLOY NORMAL WORKMANLIKE SAFETY PRECAUTIONS. USE WITH ADEQUATE VENTILATION AND WEAR GLOVES OR USE PROTECTIVE CREAM ON FACE AND HANDS IF HYPERSENSITIVE. KEEP CONTAINER CLOSED WHEN NOT IN USE. IN CASE OF SPILLAGE. ABSORB AND DISPOSE OF IN ACCORDANCE WITH LOCAL APPLICABLE REGULATIONS.

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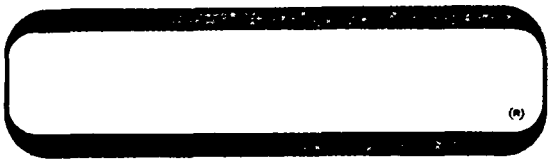

GENERIC TYPE: Single package zinc chromate/red oxide silicone alkyd primer.

GENERAL PROPERTIES: An excellent heat resistant primer for steel surfaces where operating temperatures do not exceed 450° F (232°C) continuous and 500° F (260°C) non-continuous. Has very good flexibility, excellent weathering characteristics and good chemical resistance.

RECOMMENDED USES: As a prime coat on hot piping, hot process vessels, compressors, generators, tanks, stacks and breeching.

NOT RECOMMENDED FOR: Immersion service or splash and spillage of strong acids, alkalies or solvents. Unless curing equipment or ovens are available or special handling is used, Carboline HM-21 Primer is not recommended for fabrication shop use.

CHEMICAL RESISTANCE GUIDE: (With recommended topcoat after heat curing of six hours at 300°F (149°C) minimum).

Exposure	Splash and Spillage	Fumes
Acids	Good	Very good
Alkalies	Fair	Good
Solvents	Good	Very good
Salt	Excellent	Excellent
Water	Excellent	Excellent

TEMPERATURE RESISTANCE: (non-immersion)
Continuous: 450° F (232°C)
Non-continuous: 500°F (260°C)

FLEXIBILITY: Very good. WEATHERING: Excellent.

ABRASION RESISTANCE: Good.

SUBSTRATES: Apply over properly prepared steel, cast iron, galvanizing, aluminum or others as recommended.

TOPCOAT REQUIRED: For best results, topcoat with one or two coats of Carboline HM-70 Finish. Do not topcoat with coatings such as epoxies or vinyls containing strong solvents.

COMPATIBILITY WITH OTHER COATINGS: Apply directly to substrate.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
Carboline HM-21 Primer	45%±2%

RECOMMENDED DRY FILM THICKNESS PER COAT: 2 roils (50 microns)

THEORETICAL COVERAGE PER GALLON:
722 mil sq. ft. (18.0 sq. m/1 at 25 microns)
361 sq. ft. at 2 roils (9.0 sq. m/1 at 50 microns)

***NOTE: Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.**

SHELF LIFE: 12 months minimum.

COLORS: Brown only.

GLOSS: Flat.

Prices may be obtained from Carboline Sales Representative or Main Office.

APPROXIMATE SHIPPING WEIGHT:

	1's	5's
Carboline HM-21 Primer	11 lbs. (5.0 kg)	56 lbs. (25.5 kg)
Carboline Thinner #45	9 lbs. (4.1 kg)	45 lbs. (20.4 kg)
Carboline Thinner #85	9 lbs. (4.1 kg)	45 lbs. (20.4 kg)

FLASH POINT: (Pensky-Martens Closed Cup)

Carboline HM-21 Primer	105°F (41°C)
Carboline Thinner #45	105°F (41°C)
Carboline Thinner #85	40°F (4°C)

Oct. 82 Replaces Feb. 80-N

SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in Carboline Thinner #2 or toluol in accordance with SSPC-SP 1.

Steel: For maximum protection, dry abrasive blast to a Commercial Blast Finish in accordance with SSPC-SP 6-63 to a degree of cleanliness in accordance with NACE #3 to obtain a 1½ mil (40 micron) maximum blast profile. Minimum acceptable preparation is hand tool cleaning in accordance with SSPC-SP 2-63.

MIXING: Mix to a uniform consistency before thinning.

Spray: Thin up to 25% by volume with Carboline Thinner #85.

Brush: Thin up to 10% by volume with Carboline Thinner #45.

APPLICATION TEMPERATURES:

	Material	Surfaces
Normal	50-90°F (10-32°C)	55-90°F (13-32°C)
Minimum	32°F (2°C)	35°F (2°C)
Maximum	120°F (49°C)	150°F (66°C)

	Ambient	Humidity
Normal	55-100°F (13-38°C)	30-95%
Minimum	35°F (2°C)	0%
Maximum	120°F (49°C)	98%

Do not apply when the surface temperature is less than 5°F (2°C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use sufficient air volume for correct operation of equipment.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edges first, making an extra pass later.

NOTE: The following equipment has been found suitable, however, equivalent equipment may be substituted.

CONVENTIONAL: Use 3/8" minimum I.D. material hose. Hold gun approximately 12-14 inches from the surface and at a right angle to the surface.

Mfr. & Gun	Fluid Tip	Air Cap
Binks #18 or #62	63C	63PB
DeVilbiss P-MBC or JGA	FF	704
	approx. .052" I.D.	

AIRLESS: Use 3/8" minimum I.D. material hose. Hold gun approximately 18-20 inches from the surface and at a right angle to the surface.

Mfr. & Gun	Pump*
DeVilbiss JGA-5026	QFA-519
Graco 205-162	President 30:1 or Bulldog 30:1
Binks Model 500	Mercury 5C

Use .013"-.017" tip with 1800-2000 psi.

*Teflon packings are recommended and are available from pump manufacturer.

BRUSH: For small areas or touch-up only. Use a medium bristle brush, applying with full strokes. Avoid rebrushing.

DRYING TIMES: At 2 mil (50 microns) DFT at 50% R.H.

	Dry to Touch	Dry to Recoat
40°F (4°C)	48 hrs.	60 hrs.
50°F (10°C)	36 hrs.	48 hrs.
60°F (16°C)	30 hrs.	30 hrs.
75°F (24°C)	24 hrs.	24 hrs.
90°F (32°C)	24 hrs.	24 hrs.

CLEAN UP: Use Carboline Thinner #2 or xylol.

STORAGE CONDITIONS:
Temperature: 35°F (2°C) to 110°F (43°C)
Humidity. 0-100%

CAUTION: CONTAINS COMBUSTIBLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEAR FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMENT AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHERE EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AND NONSPARKING SHOES.

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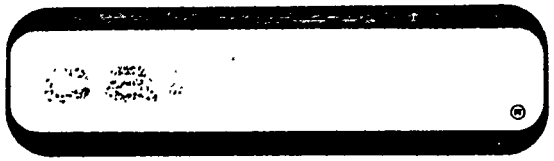

GP08

GENERIC TYPE: Single package fast drying modified alkyd. Lead and chromate free.

GENERAL PROPERTIES: An economical, high solids, VOC compliant primer for protection of steel surfaces. Easy to apply by spray with fast dry characteristics for shop applications. Good resistance to general atmospheric weathering. Most alkyd topcoats can be applied over GP-818 primer. High solids formulation meets many volatile emissions regulations.

- Good weathering and flexibility.
- High Solids, fast dry primer.
- Excellent in-shop characteristics.
- VOC (Volatile Organic Content) compliant.

RECOMMENDED USES: As a shop prime coat with appro priate topcoat for use on steel substrates such as railcars, tank exteriors, piping and related equipment to provide good corrosion protection in mild or moderate environments.

NOT RECOMMENDED FOR: Immersion service, exposure to acid, alkalies or strong solvents.

TYPICAL CHEMICAL RESISTANCE:

Exposure	Splash & Spillage	Fumes
Acids	Poor	Fair
Alkalies	NR	Poor
Solvents	Poor	Fair
Salt	Very Good	Very Good
Water	Excellent	Excellent

TEMPERATURE RESISTANCE:
Continuous: 200° F (93° C)
Non-continuous: 250° F (121° C)

SUBSTRATES: Apply over properly prepared steel or other ferrous metals as recommended.

COMPATIBLE COATINGS: Apply directly to substrate. Should be topcoated with alkyds, silicone-alkyds, oil-based or others as recommended. Do not topcoat with coatings containing strong solvents such as many epoxies and vinyls.

VOLATILE ORGANIC CONTENT (VOC)* :
As supplied: 3.04 lbs/gal. (364 g/1)
Thinned: The following are nominal values utilizing CARBOLINE Thinner #85.

0/0 Thinned	Fluid Ounces/Gal.	Pounds/ Gallon	Grams/ Liter
:0"/0	13	3.36	7

*varies with color.

RECOMMENDED DRY FILM THICKNESS PER COAI?
2 roils (50 microns)

Dry film thicknesses in excess of 4 mils (200 microns) are not recommended.

THEORETICAL COVERAGE PER MIXED GALLON :
914 mil sq. m. (22.8 sq.mt.at 25 microns)
457 sq. ft. at 2 roils (1 1.4 sq. m/l at 50 microns)

Mixing and application losses will vary and must be taken into consideration when estimating job requirements.

STORAGE CONDITIONS: Store Indoors
Temperature: 35-110 F (2-43° C)
Humidity: 0-90'3!.

SHELF LIFE: Twenty-four months when stored at 75" F (24° C).

COLOR: Red (0500) and Buff (0200) are standard.

GLOSS: Flat

Prices may be obtained from your local Carboline Sales Representative or Customer Service Representative.

APPROXIMATE SHIPPING WEIGH17

These Instructions are not intendcd 10 show product recommendations, for specific service They are issued as an aid in determining correct surface preparation,mixi instructions and application procedure. It is assummed that the proper product rcommendations have been made: These instructions should be followed closely to obt the maximum service from the materials.

GP08

SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 in accordance with SSPC-SP 1.

Steel: For maximum protection, abrasive blast to a Commercial Finish in accordance with SSPC-SP 6 to obtain a profile of 1-1/2 roils (40 microns). Minimum surface preparation is hand tool clean in accordance with SSPC-SP 2.

MIXING: Power mix to a uniform consistency before using.

THINNING: Not normally required for most applications. May be thinned up to 10% with CARBOLINE Thinner #85 for hot or windy conditions or as ambient conditions dictate.

Refer to Specification Data for VOC information.

Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and will void product warranty whether express or implied.

APPIJCATION CONDITIONS:

	Material	Surfaces	Ambient	Humidity
Normal	50-90°F (10-32°C)	55-90°F (13-32°C)	55-100°F (13-36°C)	30-90%
Minimum	35°F(2°C)	35° F (2°C)	35° F (2°C)	0%
Maximum	120°F (49° C)	165° F (74°C)	120° F (49°C)	95%

Do not apply when the surface temperature is less than 5° F or 2° C above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: The following spray equipment has been fou suitable and is available from manufacturers such Binks, DeVilbiss and Grace.

Conventional: Pressure pot equipped with dual regulato air powered agitator, 3/8" I.D. minimum material hos .052 I.D. fluid tip and appropriate air cap.

Airless:

Pump Ratio: 30:1* (minimum)
***GPA4 Output:* 3.0 (minimum)**
***Material Hose: 3W'* I.D. (minimum)**
Tip Size: .013-.017"
Output psi: 1800-2000
***Filter Size: 60-100* mesh**

Teflon packings are recommended and are availab from the pump manufacturer.

BRUSH OR ROLLER: For small areas or touch-up only. U a natural bristle brush applying full strokes. Use a sho nap mohair roller with a phenolic core.

DRYING TIMES: At 2 roils (50 microns) dry film thickne and 70° F (21° C).

To Topcoat: 1 hour

CLEANUP Use CARBOLINE Thinner #2.

CAUTION: READ AND FOLLOW ALL CAUTION STATE MENTS ON THIS PRODUCT DATA SHEET AND ON TH MATERIAL SAFETY DATA SHEET FOR THIS PRODUCT.

CAUTION CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEAR FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EOUIPMENT AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHERE EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO uSE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AND NONSPARKING SHOES.

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DM58

GENERIC TYPE: Modified medium oil alkyd. Lead and chromate free.

GENERAL PROPERTIES: A high solids, VOC compliant, high gloss alkyd that dries to a uniform tough film. Provides good protection in mild environments without a primer over suitably prepared metal surfaces.

- High solids, High gloss alkyd.
- Excellent application properties.
- Quick dry characteristics.
- Good corrosion protection and weatherability.
- Excellent flexibility.
- VOC (Volatile Organic Content) compliant.

RECOMMENDED USES: As a self priming direct-to-metal finish for railcars, tank exteriors, piping, miscellaneous metal parts and equipment. May be used over most alkyd primers for additional protection. To be used where a combination of high gloss appearance, single coat application, moderate protection, and economy dictate.

NOT RECOMMENDED FOR: Immersion service or splash and spillage of acids, alkalies or strong solvents.

TYPICAL CHEMICAL RESISTANCE:

Exposure	Splash & Spillage	Fumes
Acids	NR	Poor
Alkalies	NR	Poor
Solvents	NR	Poor
Salt	Good	Good
Water	Excellent	Excellent

TEMPERATURE RESISTANCE:
Continuous: 200° F (93° C)
Non-continuous: 250° F (121°C)

SUBSTRATES: Apply over properly prepared metal or others as recommended.

TOPCOAT REQUIRED: None. Optional second coat or the use of a separate primer will give a longer service life.

COMPATIBLE COATINGS: May be applied over most alkyd primers or direct to steel.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume*
CARBOLINE DTM 58	58% ± 270

VOLATILE ORGANIC CONTENT*
As Supplied: 3.05 lbs.fgal. (366 g/1)
Thinned: The following are nominal values utilizing CARBOLINE Thinner #10.

% Thinned	Fluid Ounces/Gal.	Pounds/ Gallon	Grams/ Liter
10"/0	13	3.44	410

● May vary with certain colors.

RECOMMENDED DRY FILM THICKNESS:
3-4 roils *(75-1 00* microns!.
2-3 rnils (50-75 microns) when used with a primer.

Film thickness must be achieved with a special technique. See Spray section under Application Instructions.

THEORETICAL COVERAGE PER MIXED GALLON:
930 mil sq. ft. (23.2 sq, m/1 at 25 microns)
310 sq. ft. at 3 roils [7.7 sq. m/1 at 75 microns)

Mixing and application losses will vary and must be taken into consideration when estimating job requirements.

STORAGE CONDITIONS: Store Indoors
Temperature: 35-110 F (2-43 C)
Humidity: 0-90%

SHELF LIFE: Twenty-four months when stored at 75° F (24° C).

COLORS: Available in a variety of colors. Consult your local Carboline Representative or Customer Service Representative for availability.

GLOSS: High.

Prices may be obtained from your local Carboline Sales Representative or Customer Service Representative.

APPROXIMATE SHIPPING WEIGHT:

	1's	5's
CARBOLINE DTM 58	12 tbs. (5 kg)	57 lbs. (26 kg)
CARBOLINE Thinner #10	8 tbs. (4 kg)	39 lbs. (18 kg)

FLASH POINT (Pensky-Martens Closed Cup)

CARBOLINE DTM 58	45" F (7° C)
CARBOLINE Thinner #10	83° F (2&C)

May 88- Replaces April 88-N

These instructions are not intended to shown product recommendations for specific activitate: They are used as aid in determining correct surface preparation, mixing instructions and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to obtain the maximum service from the materials.

DM58

SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 in accordance with SSPC-SP 1.

Steel: For maximum protection, abrasive blast to a Commercial Finish in accordance with SSPC-SP 6 to obtain a profile of 1-1/2 miis (40 microns). Minimum surface preparation is hand tool clean in accordance with SSPC-SP 2.

MIXING: Power mix to a uniform consistency before using.

THINNING: Thinning not normally required of most applications. May be thinned 5-100/o with CARBOLINE Thinner #10 where conditions dictate.

Refer to Specification Data for VOC information.

use of thinners other than those supplied or approved by Carboline may adversely affect product performance and will void product warranty whether express or implied.

APPLICATION CONDITIONS:

	Material	Surfaces	Ambient	Humidity
Normal	50-90° F (10-32°C)	55-9°F (13-32°C)	55-100° F (13-38°C)	30-900/.
Minimum	35° F (2° C)	35° F (T C)	35°F (2°C)	0%
Maximum	120°F (49° C)	165°F (74°C)	120°F (49°C)	95%

Do not apply when the surface temperature is less than 5°F or 2° C above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: The following spray equipment has been found Suitable and is available from manufacturers such as Binks, DeVilbiss and Grace.

A tack coat followed by a full coat technique is required for appearance and ease of application. Minimum time between tack coat and full coat is one minute to allow solvent to flash.

Conventional: Pressure pot equipped with dual regulators 3/8" I.D. minimum material hose, 0.052" I.D. fluid tip and appropriate air cap.

Airless:
Pump Ratio: 30:1 (min.)
GPM Ou@t: 3.0 (min.)
Material Hose: 31W I.D. (min.)
Tip Size: .013-.017"
Output psi: 1800-2000
Filter: 60 mesh

Teflon packings are recommended and are available from the pump manufacturer.

BRUSH OR ROLLER: For small areas or touch up only. Use a medium bristle brush, applying with full strokes. Avoid rebrushing.

DRYING TIMES: These times are based on recommended dry film thickness at 75" F (24" G).
To Touch: 40 minutes
To Recoat: 40 minutes
To Stencil: 1-1/2 hours

CLEANUP Use CARBOLINE Thinner #2.

CAUTION: READ AND FOLLOW ALL CAUTION STATEMENTS ON THIS PRODUCT DATA SHEET AND ON THE MATERIAL SAFETY DATA SHEET FOR THIS PRODUCT.

CAUTION CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEAR FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMENT AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHERE EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AND NONSPARKING SHOES.

GENERIC TYPE: Epoxy-coal tar. Part A and Part B mixed prior to application.

GENERAL PROPERTIES: A heavy-duty, high-build epoxy-coal tar coating for the protection of steel and concrete in immersion service. Can be applied at thicknesses up to 12 roils (300 microns) per coat. Cures *to* a hard, smooth finish. Simple 1:1 mixing ratio. Both components have low viscosity resulting in easy mixing.

RECOMMENDED USES: Lining for tanks, piping, trenches, sumps and as heavy-duty maintenance coating for steel and concrete - splash, spillage and fumes. Widely used for protection of offshore structures, marine installations and pilings. Also as lining for barges and tankers carrying sour crude, petroleum products and salt water ballast. Recommended for concrete and steel surfaces in sewage treatment plants, paper mills, chemical plants, etc. Excellent protection for underground surfaces.

NOT RECOMMENDED FOR: Immersion in aromatic or ketone solvents; strong oxidizing acids.

CHEMICAL RESISTANCE GUIDE:

Exposure	Immersion	Splash and Spillage	Fumes
Acids	Very Good	Excellent	Excellent
Alkalies	Very Good	Excellent	Excellent
Solvents	Fair	Good	Very Good
Salt	Excellent	Excellent	Excellent
Water	Excellent	Excellent	Excellent

TEMPERATURE RESISTANCE: (Non-immersion)
Continuous: 200° F (93"C)
Non-continuous: 300"F (150"C)

For immersion, temperature depends on exposure, but maximum is 130"F (54"C).

FLEXIBILITY: Fair **WEATHERING:** Good (chalks)

ABRASION RESISTANCE: Very Good

SUBSTRATES: Apply to properly prepared steel or others as recommended.

TOPCOAT REQUI RED: None required. May be topcoated with CARBOLINE Anti-fouling paints as directed. Coal tar bleed-through is likely with most topcoats.

COMPATIBILITY WITH OTHER COATINGS: Coating is self-priming. Can ,also be applied over catalyzed epoxie~ or others as recommended. An acceptable primer for steel is CAR BOLINE 193 Primer. When an inorganic zinc primer is used, a tie-coat of CAR BOLINE 193 Primer or CARBOLINE D893 is recommended. For concrete, epoxy surfacer may be necessary.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
CAR0MASTIC 14	75% ± 2%

RECOMMENDED DRY FILM THICKNESS PER COAT: 8 roils (200 microns)

THEORETICAL COVERAGE PER MIXED GALLON*:
1203 mil sq. ft. (30 sq. m/1 at 25 microns)
150 sq. ft. at 8 roils (3.7 sq. m/1 at 200 microns)

● **NOTE:** Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: 24 months minimum when stored at 75° F (24°C).

COLORS. **Black and dark red only.**

GLOSS: High initially, becomes flat.

Prices may be obtained from Carboline sales representative or main office.

APPROXIMATE SHIPPING WEIGHT:

	2's	10's
CARBOMASTIC 14	28 lbs.(12.7 kg)	135 lbs. (61.3 kg)
CARBOMASTIC Thinner	9 lbs. in 1's (4.1 kg)	45 lbs. in 5's (20.4 kg)
Surface Preparation #1	9 lbs. in 1's (4.1 kg)	45 lbs. in 5's (20.4 kg)

FLASH POINT: (Pensky-Martens Closed Cup):
CARBOMASTIC 14 Part A 78° F (26°C)
CARBOMASTIC 14 Part B 84° F (29"C)
CAR BOMASTIC Thinner 83°F (28"C)
Surface Preparation #l 73° F (23°C)

These instructions are not intended to show recommendations for specific service. **They are issued as an aid in determining correct surface preparation,** mixing **instrucitons and applicaton procedure. It is assumed that the proper product recommendatons have been made These instructions should be** fOllowed closely to obtain the maximum service from the materials.

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SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 in accordance with SSPC_P 1.

Steel: For immersion service, abrasive blast to a White Metal Finish in accordance with SSPC-SP 5-82 to a degree of cleanliness in accordance with NACE #1 to obtain a 2 to 3 mil (50-75 micron) blast profile. For non.immersion, abrasive blast to a Commercial finish in accordance with SSPC-SP 6-82 to a degree of cleanliness in accordance with NACE #3 to obtain a 2 to 3 mil (50-75 micron) blast profile. Acceptable for non-immersion SSPC-SP 3.82, Power Tool cleaning.

MIXING: Power mix separately, then combine and mix in the following proportions:

	2 Gal. Kit	10 Gal. Kit
CARBOMASTIC 14 Part A	1 Gal.	5 Gals.
CARBOMASTIC 14 Part B	1 Gal. .	5 Gals.

Thin up to 25% by volume with CARBOMASTIC Thinner.

Nota: Use of thinner other than those supplied or approved by Carbcdine may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE: Six hours at 75° F (24°C) and less at higher temperatures. Pot life ends when the coating loses body and begins to sag.

APPLICATION TEMPERATURES:

	Material	surfaces
Normal	65-85°F (18-29°C)	60-95°F (16-35°C)
Minimum	55°F (13”C)	50”F (10”C)
Maximum	90°F (32”C)	120”F (49°C)
	Ambient	**Humidity**
Normal	60-90”F (16-32°C)	20-60%
Minimum	50°F (10”C)	o%
Maximum	120”F (49”C)	65%

D: not apply when the surface temperature is less than 5° F (2 C) above the dew point.

Excessive humidity or condensation on surface during curing may *result* in a surface haze, or blush, which must be washed off with water before recoating.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use sufficient air volume for correct operation of equipment.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edges *first,* making an extra pass later.

NOTE: l%e following equipment has been found suitable, however, equivalent equipment may be substituted.

Coventional: Use 1/2” minimum I.D. material hose. Hold gun approximately 12.14 inches from the surface and at a right angle *to* the surface.

Mfr. & Gun	Fluid Tip	Air Cap
Binks #18 or #62	67	67PB
DeVilbiss P-MBC or JGA	D	64
	approx. .086” I.D.	

Airless: Use 1/2” minimum I.D. material hose. Hold gun approximately 18-20 inches from the surface and at a right angle *to* the surface.

Mfr. & Gun”	Pump*
Graco 207-300	Bulldog 30:1 or King 45:
Binks Model 720	Jupiter B8-36 37:1
Either of the above (DeVilbiss)	HuskieQFA-519

● Revers-A-Clean tip is recommended. Use a .029’’-.033’” tip with 2400 psi.

BRUSH OR ROLLER: Use medium bristle brush or medium nap phenolic core roller.

DRYING TIMES: (at recommended thickness)

Between coats: (Note 1 and 2)	
50”F (IO°C)	4 days
60”F (16°C)	48 hours
75°F (24”C)	24 hours
90”F (32”C)	12 hours
Final Cure: (Immersion Service - Note 3)	
50”F (10”C)	14 days
60°F (16”C)	12 days
75°F (24”C)	7 days
90’F (32”C)	4 days

Note 1: If final cure is attained and recoat is necessary wipe with Surface Preparation #l before recoating.

Note 2: If exposed to sunlight for more than 36 hours wipe with Surface Preparation #1 before topcoating.

Note 3: Force curing is suggested for all tank linings. Thorough air circulation must be used during and after application until the coating is cured. The ventilation system should be capable of preventing the solvent vapor concentration from reaching the lower explosion limit for the solvents used. In addition to proper ventilation, fresh air respirators or fresh air hoods must be used by all application personnel. Where flammable solvents exist, explosion-proof lighting equipment must be used. Hypersensitive persons should wear clean protective clothing, gloves and/or protective cream on face, hands and all exposed areas.

CLEAN UP: Use CARBOLINE Thinner #2

STORAGE CONDITIONS: (Store indoors)
Temperature: 45-110° F (7-43”C) Humidity: 0-100

product data sneet

GENERIC TYPE: Two-component, high-build, modified aluminum epoxy mastic.

GENERAL PROPERTIES: CARBOMASTIC 15 Low Odor is a self-printing, high-build coating with excellent adhesion to rusted steel and most aged paints. Features include:

- Proven field performance.
- Excellent performance over minimal surface preparations.
- Low odor,
- Non-bronzing.
- Excellent application characteristics.
- Excellent film build on edges.
- Compatible with most aged coatings.
- Single coat for most applications.
- Meets the most stringent VOC (Volatile Organic Con. tent) regulations.

RECOMMENDED USES: Particularly recommended for maintenance painting of rusty steel or upgrading old coatings. Ideal for metal buildings, piping, process equipment, highway bridges and exposed structural steel. Only a single coat is required for most applications. Hand or power tool cleaning is often acceptable. CARBOMASTIC 15 Low Odor may also be used where hand tool cleaned steel is being coated for the first time.

NOT RECOMMENDED FOR: Immersion setvice in acids, alkalies or solvents.

TYPICAL CHEMICAL RESISTANCE:

Exposure	Immersion	Splash & Spillage	Fumes
Acids	NR	Fair	Very Good
Alkalies	NR	Good	Excellent
} Solvents	NR	Good	Excellent
Salt Water	Excellent*	Excellent	Excellent
Water	Excellent*	Excellent	Excellent

*Discolors to gray.

TEMPERATURE RESISTANCE: (non-immersion)
Continuous: 180° F (82" C)
Non-continuous: 250° F (121° C)

SUBSTRATES: Rusty steel, aged galvanized steel or others as recommended.

COMPATIBLE COATINGS: May be used over most generic types of coatings which are tightly adhering and properly prepared. A test patch is recommended over existing coatings, A mist coat maybe required over inorganic zinc to minimize bubbling. A topcoat is not normally required. Most generic types of coatings are suitable as topcoat. Consult Carboline Technical Service for specific recommendations,

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
CARBOMASTIC 15 Low Odor	90°G = 2%

VOLATILE ORGANIC CONTENT:
As Supplied: 0.74 lbs.;gal.(88 gramsrliter)
Thinned: The following are nominal values:

Thinner	% Thinned	Fluid Ozs/GaL	LflsJ Gal.	Grams/ Liter
CAR80MASTIC Thmwr	-II	32(1 quart)	2.02	242
CARBOLINE" Thinner #76	25	32(1 quard	1.93	231

RECOMMENDED DRY FILM THICKNESS PER COAT
5 roils (125 rnicronq) minimum (Measured excluding the rust on steel substrate).

For severe exposures including immersion, 7 roils (175 microns) minimum or 2 coats at 5 mils(125 microns) each IS recommended.

Dry film thickness in excess of 10 mils(250 microns) per coat is not recommended. Excessive film thickness over inorganic zinc will increase damage during shipping and erection.

THEORETICAL COVERAGE PER MIXED GALLON:
1444 mii sq. ft. (36.0 sq. mil at 25 microns)
289 sq. ft. at 5 roils (7.2 sq. m/1 at 125 microns)

STORAGE CONDITIONS: Store Indoors
Temperature: 45-110° F (7-43" C) Humidity: ()-907.

SHELF LJFE: Twenty-four months when stored at 7S F (24' c).

COLOR: Aluminum (C901) is standard. Red (M500) is available for use as a contrasting primer in multiple coat applications.

Prices may be obtained from your Carboline Sales Representative or Carboline Customer Service Department.

APPROXIMATE SHIPPING WEIGHT:

	2 Gal. Kit	10 Gal. Kit
CAR80MASTIC 15 Low Odor	25 lbs. (11 kg)	124 tbs. (56 kg)
CARBOMASTIC Thinner	8 tbs. (4 kg) in 1's	40 lbs. (18 kg) in 5's
CARBOLINE Thinner # 76	8 lbs. (4 kg) in 1"s	37 tbs. (17 kg) in Ss

FLASH POINT (Pensky-Martens Closed Cup)

CARBOMASTIC 15 Low Odor Part A	>200° F (> 93° C)
CARBOMASTIC 15 Low Odor Part B	76° F (24° C)
CARBOMASTIC Thinner :	83° F (28° C)
CARBOLINE Thinner # 76 '	21 °F(-&c)

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These instructions are not intended to show product recommendations for specific service. They are issued as aid in determining correct surface preparation, mi instructions and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to ob the maximum service from the materrials.

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SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 or Surface Cleaner #3 (refer to SC#3 instructions) in accordance with SSPC-SP 1.

Steel:

NON-IMMERSION SERVICE: Power Tool or Hand Tool clean in accordance with SSPC-SP 3 or SSPC-SP 2, to produce a rust-scale free surface. Water blasting, followed by Hand or Power Tool cleaning is acceptable to standards as defined by SSPC-SP 2. For more severe environments, abrasive blast per SSPC-SP 7 (brush-off blast) to a degree of cleanliness defined by SSPC-Sa 1 pictorial standards.

WATER IMMERSION SERVICE: Abrasive blast to a Near White Metal Finish in accordance with SSPC-SP 10 (or NACE #2) to obtain a 1-3 mil (25-75 micron) blast profile.

MIXING: Power mix separately, then combine and mix in the following proportions:

	2 Gal. Kit	10 Gal. Kit
CARBOMASTIC 15 Low Odor Part A	1 gallon	5 gallons
CARBOMASTIC 15 Low Odor Part B	1 gallon	5 gallons

THINNING: May be thinned up to 250/. by volume with CARBOMASTIC Thinner. To extend pot life, may be thinned up to 25V0 by volume with CARBOLINE Thinner #76 (see Pot Life information).

NOTE: Use of thinners other than those supplied or approved by-Carboline may adversely affect product performance and will void product warranty, whether express or implied.

Refer to Specification Data for VOC information.

POT LIFE: Four hours at 75" F (24° C) when thinned 25% two hours at 75° F (24° C) unthinned and one hour at 90° F (32° C) unthinned. CARBOLINE Thinner #76 may be substituted to extend pot life to 2 hours at 90" F (32° C). Pot life ends when coating becomes too viscous to use.

APPLICATION CONDITIONS:

	Material	Surfaces	Ambient	Humiditv
Normal	65-85°F (18-29° C)	65-85° F (18-29" C)	65-85° F (18-29" C)	35-800/.
Minimum	50" F(IO°C)	50" F(ICf' C)	5CP F(IO°C)	0%
Maximum	90" F (3T C)	131Y' F (54° C)	100" F 138° C)	95%

Do not apply when surface temperature is less than 5 F or 2°C above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: The following spray equipment has been fou suitable and is available from manufacturers such Binks, DeVilbiss and Grace.

Conventional: Pressure pot equipped with dual regulat 3/6" I.D. minimum material hose, .086 I.D. fluid tip a appropriate air cap.

Airless:

Pump Ratio: 30:1 (min.)*
GPM Output: 3.0 (min.)
Materia/ Hose: 3/8 I. D.(min.)
Tip Size: .019-.025"
Output psi: 1900-2100
Filter Size: 60 mesh

'Teflon packings are recommended and are availal from the pump manufacturer.

BRUSH OR ROLLER: Use clean natural bristled brush medium nap roller. Work coating into all irregularities

TOUCH-UP: For small damaged areas, hand or power sa to a featheredge, then touch-up by brush.

DRYING TIMES: These times are at 5 roils (125 micro dry film thickness. Higher film thicknesses will lengt cure times.

Dry to touch: 5 hours at 75 F (24°C).

Temperature	Between Coats	Final Cu
50 F(10 C)	5 days	15 day
6o° F(160c)	3 days	10 day
75° F (24° C)	24 hours	5 day
90° F (32° C)	18 hours	3 day

Recommended minimum cure before immersion serv is 5 days at 75° F (24° C).

VENTILATION & SAFETY When used as a tank lining or enclosed areas, thorough air circulation must be us during and after application until the coating is cured. T ventilation system should be capable of preventing t solvent vapor concentration from reaching the lov explosion limit for the solvents used. In addition to pro ventilation, fresh air respirators or fresh air hoods m be used by all application personnel. Where flammal solvents exist, explosion-proof lighting equipment m be used. Hypersensitive persons should wear clean p tective clothing, gloves and/or protective cream on fa hands and all exposed areas.

CLEANUP Use CARBOLINE Thinner # 2.

CAUTtON: READ AND FOLLOW ALL CAUTION STATEMENTS ON T PRODUCT DATA SHEET AND ON THE MATERIAL SAFETY DA SHEET FOR THIS PRODUCT.

AUTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WE RESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPME ND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHE XPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AI IONSPARKING SHOES.

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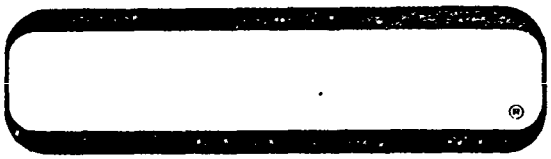

GENERIC TYPE: Epoxy-coal tar. Part A and Part B mixed prior to application.

GENERAL PROPERTIES: CARBOMASTIC 18 is a heavy-duty, epoxy-coal tar coating for the protection of steel and concrete. For immersion service it can be applied at thicknesses up to 16 roils (400 microns) in one coat. For maximum protection, two coats at 8 roils (200 microns) each may be desired. CA CARBOMASTIC 18 meets Regulation 8, Rule 19 of the Bay Area Air Quality Management District.

RECOMMENDED USES: CARBOMASTIC 18 is designed for use as a single-coat coal tar epoxy in wastewater facilities, pilings, stationary pipe exteriors or other water immersion or underground applications over steel or concrete.

NOT RECOMMENDED FOR: Immersion in aromatic or ketone solvents or strong oxidizing acids. Not recommended for areas using impressed current.

CHEMICAL RESISTANCE GUIDE:

Exposure	Immersion	Splash and Spillage	Fumes
Acids	Good	Excellent	Excellent
Alkalies	Very Good	Excellent	Excellent
Solvents	Fair	Good	Very Good
Salt Water	Excellent	Excellent	Excellent
Water	Excellent	Excellent	Excellent

TEMPERATURE RESISTANCE: (non-immersion)
Continuous: 180° F (82"C)
Non-continuous: 250" F (121" C)

FLEXIBILITY: Moderate **WEATHERING:** Good (chalks)

ABRASION RESISTANCE: Fair

SUBSTRATES: Suitably prepared steel, concrete or others as recommended.

TOPCOAT R EQUIR ED: None required

COMPATIBILITY WITH OTHER COATINGS: Coating is self-priming. Can also be applied over catalyzed epoxies or others as recommended. Acceptable primers for steel are CAR BOLIN@ 193 Primer or CAR BOMASTIC 3. When a zinc rich inorganic primer is used, a tie-coat of CAR BOLINE@ 193 Primer is recommended. For concrete, an epoxy surfacer may be necessary to patch holes.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
CARBOMASTIC 18	80% f 2%

VOLATILE ORGANIC COMPOUNDS:
1.38 lbs./srallon unthinned
1.64 lbs.fiallon thinned 5% by volume with CARBOLINE Thinner #76.

RECOMMENDED DRY FILM THICKNESS PER COAT: Single coat applied at 16 roils (400 microns). May also be applied in two coats at 8 roils (200 microns) each.

Total dry film thicknesses in excess of 30 roils (750 microns) are not recommended.

THEORETICAL COVERAGE PER MIXED GALLON:**
1283 mii. sc!. ft. (32.0 sq. m/1 at 25 microns)
80 sq. ft. at 16 roils (2.0 sq. m/1 at 400 microns)

' ● **NOTE:** Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: 12 months minimum when stored at 75° F (24"C). Storage at higher temperatures will reduce shelf life.

COLORS: Black standard; dark red available by special request.

GLOSS: High gloss initially. "Becomes flat as the coating ages.

Prices may be obtained from Carboline sales representative or main office.

APPROXIMATE SHIPPING WEIGHT.

	5's	50's
CARBOMASTIC 18	71 lbs. (32.3 kg)	714 lbs. (323.9 kg)
CARBOLINE Thinner #76	37 lbs. (16.8 kg)	

CAR BOMASTIC 18 Parts A and B may also be ordered separately in 50 gallon drums.

FLASH POINT: (Pensky-Manens Closed Cup)

CARBOMASTIC 18 Part A	61° F (16"C)
CARBOMASTIC 18 Part B	88° F (31"C)
CARBOLINE Thinner :76	21" F (-6°C)

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to be coated with clean rags soaked in CARBOLINE Thinner #2 or toluol in accordance with SSPC-SP 1-62.

Steel: For immersion service, dry abrasive blast to a White Metal Finish in accordance with SSPC.SP 5-82 to a degree of cleanliness in accordance with NACE #1 to obtain a 4.5 mil (100-125 micron) blast profile. For non-immersion service, dry abrasive blast to a *Commercial* Finish in accordance with SSPC-SP 6-62 to a degree of cleanliness in accordance with NACE #3 to obtain a 4-5 mil I1OO -125 micron) blast profile. Power tool cleaning in accordance with SSPC-SP 3-82 is acceptable for non-immersion service.

Concrete: Do not coat concrete treated with hardening solutions unless test patch indicates satisfactory adhesion. Do *not* apply coating unless concrete hea cured at least 28 days at 75°F (24°C) and 50% R.H. or equivalent time. Apply to properly prepared concrete that has been acid etched or sweep sandblasted.

MIXING: Power mix separately, then combine and mix in the following proportions:

	5 Gal. Kit	50 Gal. Kit
CAR80MASTIC 18 Part A	4 gal.	40 gal.
CARBOMASTIC 18 Part B	1 gel.	10 gal.

Thin as needed up to 5% by volume maximum with CARBOLINE Thinner #76,

NOTE: Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE Eight hours at 75°F (24°C) and leas at higher tempera. tures. Pot life ends when coating loses body and begins to sag.

APPLICATION TEMPERATURES:

	Material	surfaces
NormaJ	75°F (24"C)	75°F (24°C)
Minimum	50"F (1 O"C)	45°F (7°C)
Maximum	90"F (32"C)	1 2 0 ° F (4 9 ° C)
	Ambiant	Humidity
Normal	75°F (24°C)	20.75%
Minimum	50°F (10"C)	o%
Maximum	120"F (49"C)	85%

Do *not* apply when the surface temperature is lass than 5°F (2°C) above the dew point.

Excessive humidity or condensation on surface during curing may result in a surface haze or blush, which must be washed off with water before racoating.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use sufficient air volume for correct operation of equipment.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edges first, making an extra pass later. Care should be taken to avoid excessive film thickness in hard *to coat* areas such as fillets or inside angles.

NOTE: The following equipment has been found suitable: however, equivalent equipment may be substituted.

Conventional: Use a X inch minimum I.D. material hose. Hold gun approximately 12-14 inches from the surface and at a right angle to the surface.

Mfr. & Gun	Fluid Tip	Air Cap
Binks #18 or #62	67	67 PB
DeVilbiss MBC or JGA	D	64
	Approx. .086"' 1.D.	

Airless: Use a 1/2 " minimum I.D. material hose. Hold gun aPPro mately 18-20 inches from the surface and at a right angle to t surface.

Mfr. & Gun	Pump'
Graco 206-718	Bulldog 30:1
Binks Model 720	B8-36 37:1
Either of the above	QFA-519 (DeVilbiss)

"Teflon packings are recommended and are available from man facturer. Reverse-A-Clean tip is recommended.

Use a .025..031" tip with 2400 psi.

BRUSH OR ROLLER: Use a medium bristle brush, applying wi full strokes. Avoid rebrushing. I! rolled, use a medium nap roll with phenolic *core.* Avoid rerolling. Brush or roller application ma require multiple coats to obtain proper dry film thickness. Whe using CARBOMASTIC 18 as a tank lining, *do not apply by rolle* Roller application may leave voids in the film.

DRYING TIME: (at 16 mil [400 micron] film thickness)

NOTE: Curing at high humidity may cause discoloration, but w not affect performance.

	Dry to Handle	Final cure: (Note 1)
50"F (10"C)	4 days	14 days
60°F (16°C)	36 hours	12 days
75°F (24°C)	24 hours	7 days
80"F (32"C)	14 hours	4 days

Between coats: (Note 2)

Note 1: Force curing is recommended for all tank linings. Cure 24 hours at 60-80°F (16-27"C) with ventilation prior to and duri heat cure. Raise surface temperature to 140-160"F (60-71°C) a maintain for a four hour period for final cure.

Note 2: When applied at controlled wet film thickness of 8-10 ro per coat (two-coat system), recoating at 75°F (24°C) must be do between three hours minimum and seven days maximum. Excessi humidity or condensation on surface during curing may *result* in surface haze or blush, which must be washed off with water befo recoating.

VENTILATION AND SAFETY. If used as a tank lining or enclosed areas, ventilate at least 24 hours at 60=0°F (16-27° after final application prior to applying external heat. Thorough circulation must be used during and after application until the co ing is cured. The ventilation system should be capable of preventi the solvent vapor concentration from reaching the lower explosi limit for the solvents used. In addition to proper ventilation, fre air respirators or fresh air hoods *must* be used bv all application P sonnel. Where flammable solvents exist, explosion-proof lighti equipment must be used. Hypersensitive persons should wear cle protective clothing, gloves and/or protective cream on face. han and all exposed areas.

CLEAN UP: Use CARBOLINE Thinner #76.

STORAGE CONDITIONS:

Temperature: 45-1 10°F (7413"C) Humidity: 0-100

GENERIC TYPE: Two component, high-build, modified aluminum epoxy mastic.

GENERAL PROPERTIES: A high-build epoxy mastic primer with excellent adhesion to rusted steel, blasted steel and most aged coatings. High film build allows for single coat applications up to 8 roils. Features include:

- Excellent performance over minimal surface preparation.
- Compatibility with most aged coatings.
- Excellent film build on edges.
- Accepts most topcoat types.
- Meets the most stringent VOC (Volatile Organic Content) regulations.

RECOMMENDED USES: Particularly recommended for repainting rusty steel and for upgrading old, deteriorated coatings. Ideal for maintenance painting of highway bridges, as a touch-up primer for shop primed steel or priming process equipment which cannot be abrasive blasted. Generally used for industrial applications requiring a surface tolerant primer with broad spectrum chemical resistance.

NOT RECOMMENDED FOR: Immersion service in acids, alkalies or solvents.

TYPICAL CHEMICAL RESISTANCE:

Exposure	Immersion	Splash & Spillage	Fumes
Acids	NR	Fair	Very Good
Alkalies	NR	Fair	Very Good
Solvents	NR	Good	Excellent
Salt Water	Excellent	Excellent	Excellent
Water	Excellent	Excellent	Excellent

TEMPERATURE RESISTANCE: (non-immersion)
Continuous: 180"F (82"C)
Non-continuous: 250"F (121"C)

SUBSTRATES: Rusty steel, aged galvanized steei or others as recommended.

COMPATIBLE COATINGS: May be used over most generic types of coatings which are tightly adhering and properly prepared. A test patch is recommended for use over existing coatings. A mist coat is required to minimize bubbling over inorganic zinc primers. For improved performance, may be topcoated with vinyls, urethanes, epoxies and other generic types as recommended.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
CARBOMASTIC 90 AL	90 z 2%

VOLATILE ORGANIC CONTENT
AS SUPPLIED: 0.70 lbs./gal. (84 gramsfliter)
THINNED: The following are nominal values utilizing CARBOLINE Thinner #2

7. Thinned	Fluid Ounces/Gal.	Poundsl Gallon	Grams/ Liter
25%	32(1 quart)	1.98	237

RECOMMENDED DRY FILM THICKNESS PER COAT "
5 roils(125 microns)

For more severe exposures 2 coats at 5 roils (125 microns) or 1 coat at 8 roils (200 microns) is recommended.

Dry film thicknesses in excess of 10 roils (250 microns) per coat are not recommended.

THEORETICAL COVERAGE PER MIXED GALLON:
1444 mil sq. ft. (36.0 sq. mil at 25 microns)
289 sq. ft. at 5 roils (7.2 sq. m/1 at 125 microns)

Mixing and application losses will vary and must be taken into consideration when estimating job requirements.

STORAGE CONDITIONS: Store Indoors
Temperature: 40-1 10"F (4-43"C)
Humidity: 0-95'?4.

SHELF LIFE: Twelve months minimum when stored at 75°F (24"C).

COLOR: Dark aluminum only (Gun Metal Gray).

Prices may be obtained from your local Carboline Sales Representative or Main Office.

APPROXIMATE SHIPPING WEIGHT

	2 Gallon Kit	10 Gallon Kit
CARBOMASTIC 90 AL	29 lbs. (13 kg)	143 lbs. (65 kg)
CARBOLINE Thinner #2	8 lbs. (4 kg)	39 lbs. (18 kg)

FLASH POINT (Pensky-Martens Closed Cup)

CAR80MASTIC 90 AL Part A	72°F (22°C)
CARBOMASTIC 90 AL Part B	10O"F (38"C)
CARBOLINE Thinner #2	24°F (-5"C)

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining correct surface preparation, mixing instructions and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to obtain the maximum service from the materials.

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SURFACE PREPARATION: Remove any oil or grease from surface with clean rags soaked in CARBOLINE Thinner #2 or Surface Cleaner #3 (refer to instructions) in accordance with SSPC-SP 1.

Steel: NON-IMMERSION SERVICE: Power Tool or Hand Tool clean in accordance with SSPC-SP 3 or SSPC-SP 2, respectively to produce a rust-scale free surface. Water blasting, followed by Hand Tool or Power Tool cleaning as required, is an acceptable means of preparing the surface to a cleanliness defined by SSPC-SP 2. Alternatively, for more severe environments, abrasive blast per SSPC-SP 7 (brush-off blast).

IMMERSION SERVICE: Abrasive blast to a Near White Metal Finish in accordance with SSPC-SP 10 (or NACE #2) to obtain a 1-3 mil (25-75 micron) blast profile.

MIXING: Power mix separately, then combine and mix in the following proportions:

	2 Gal. Kit	10 Gal. Kit
CARBOMASTIC 90 AL Part A	1 gallon	5 gallons
CARBOMASTIC 90 AL Part B	1 gallon	5 gallons

THINNING: May be thinned up to 250/. by volume with CARBOLINE Thinner #2.

Refer to Specification Data for VOC information.

Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and will void product warranty whether express or implied.

POT LIFE: Four hours at 75°F (24°C) and less at higher temperatures. Pot life ends when coating loses body and begins to sag.

APPLICATfON CONDITIONS:

	Material	Surfaces	Ambient	Humidity
Normal	60-85°F (16-29°C]	60-85°F (16-29"C]	60-65°F (16-2YC)	0-80%
Minimum	50°F (10"C)	50°F (10°C)	50°F (10°C)	0%
Maximum	90°F (32°C)	130°F (54°C)	100°F (38°C)	95%

Do not apply when the surface temperature is less than 5' F (or 2°C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: The following spray equipment has been found suitable and is available from manufacturers such as Binks, DeVlbiss and Grace.

Conventional: Pressure pot equipped with dual regulators 3/8" I.D. minimum material hose, .070 I.D. fluid tip and appropriate air cap.

Airless:
Purvp Ratio: 30:1 (min.)'
GPM Output: 3.0 (min.)
Material Hose: 318"LD. (min.)
Tip *Size:* .017-.021"
Output psi: 1800-2200
Filter Size: 60 mesh

*Teflon packings are recommended and are available from the pump manufacturer.

BRUSH OR ROLLER: Use clean natural bristled. brush or medium nap roller. Work coating into all irregularities. Avoid rebrushing or rerolling.

DRYING TIMES: These times are at 5 roils (125 microns) dry film thickness. Higher film thicknesses will lengthen cure times.

Temperature	Between Coats	Final Cure
50F (10"C)	3 days	15 days
60F (16"C)	2 days	10 days
75°F (24°C)	18 hours	5 days
9V'F (32°C)	12 hours	3 days

CLEANUP Use CARBOLINE Thinner #2.

CAUTION: READ AND FOLLOW ALL CAUTION STATEMENTS ON THIS PRODUCT DATA SHEET AND ON THE MATERIAL SAFETY DATA SHEET FOR THIS PRODUCT.

GENERIC TYPE: High-build, aluminum-filled epoxy urethane mastic, Part A and B mixed prior to application.

GENERAL PROPERTIES: CARBOMASTIC 242 is principally designed as a low temperature cure coating. CARBOMASTIC 242 will cure at temperatures as low as 0° F (-18" C) and will dry to handle or recoat in 24 hours at 20° F (-7" C). It is a self-priming, high-build coating with excellent adhesion to rusted steel and most aged coatings. Hand or power tool cleaning is acceptable surface preparation for most surfaces. For severely corroded surfaces, see surface preparation instructions for non-immersion service on back page.

RECOMMENDED USES: CARBOMASTIC 242 is primarily recommended where conventional coatings cannot be used due to cold weather for repainting rusty steel and for upgrading old, deteriorated coatings. Also used where hand-cleaned steel is being coated for the first time. Ideal for metal buildings, piping, process equipment, highway bridges and exposed structural steel.

NOT RECOMMENDED FOR: Immersion service in any environment (except water) without suitable topcoat, or over rusty steel in a severe or salt environment.

CHEMICAL RESISTANCE GUIDE:

Exposure	Immersion	Splash and Spillage	Fumes
Acids	NR	Fair	Very Good
Alkalies	NR	Good	Excellent
Solvents	NR	Good	Excellent
Salt	Fair	Excellent	Excellent
Water	Excellent	Excellent	Excellent

TEMPERATURE RESISTANCE:
Non-immersion
Continuous: 180" F (82° C) Non-continuous: 200" F (93' C)

Immersion
Continuous: 100° F (38" C) Non-continuous: 130 F (54' C)

FLEXIBILITY Excellent.

WEATHERING: Very Good (chalks)

ABRASION RESISTANCE: Fair.

SUBSTRATES: Rusty steel, aged galvanized steel or others as recommended.

TOPCOAT REQUIRED: Normally none, but can be topcoated with most generic types. Consult Carboline Technical Service for specific recommendations.

COMPATIBILITY WITH OTHER COATINGS: May be used over most generic types of coatings which are tightly adhering and properly prepared; including inorganic and organic zinc primers. A mist coat is rccornnwnded when used over inorganic zinc primers. A tesr patch is recommended for use over existing coatings.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
CARBOMASTIC 242	62% ± 2%

VOLATILE ORGANIC CONTENT:
Thinned 5% by volume
with CARBOLINE Thinner #92
2.98 lbs. gal. (357 gms. liter)

RECOMMENDED DRY FILM THICKNESS PER COAT:
5 mils (125 microns) over unprimed steel and existing coatings
3 mils (75 microns) over inorganic zinc rich primers

THEORETICAL COVERAGE PER MIXED GALLON*:
994 mil sq. ft. (24.8 sq. m/l at 25 microns)
331 sq. ft. at 3 mils (8.3 sq. m/l at 75 microns)
199 sq. ft. at 5 mils (5.0 sq. m/l at 125 microns)

*NOTE: Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: (When stored at 75 F (24" C))
Part A: Twenty-four months minimum
Part B: Nine months minimum

COLORS: Aluminum C901, Metallic Blue M100, Metallic Green M300, and Metallic Red M500 only.

NOTE: Color variation within a batch and from batch to batch may occur due to metallic pigments and application techniques. Colors other than aluminum should be used as a base coat for differentiation and should always be topcoated.

prices may be obtained from your Carboline Sales Representative or Main Office.

APPROXIMATE SHIPPING WEIGH12

	1.25 Gal. Kit	5 Gal. Kit
CARBOMASTIC 242	13 tbs. (6 kg)	53 lbs. (24 kg)
CARBOLINE Thinner #92	9 lbs. (4 kg) in 1's	42 lbs. (19 kg) in 5's

FLASH POINT (Pensky-Martens Closed Cup)

CARBOMASTIC 242 Part A	60" F (16" C)
CARROMASTIC 242 Part E	+212 F(+100'C)
{UM31N.)LINE TIIIr]i]m //92	39' F (4' C)

Nov. 86 Replaces July 85·

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining corre surface preparation, mixing instructions and application procedure. It is assumed that the proper product recommendations have been mac These instructions should be followed closely to obtain the maximum service from the materials.

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surface to be coated with clean rags soaked in CARBOLINE Thinner #10 in accordance with SSPC-SP 1-82.

Steel: For immersion service and more severe environments, abrasive blast to a White Metal Finish in accordance with SSPC-SP 5 to a degree of cleanliness in accordance with NACE #1 to obtain a 2-3 mil (50-75 micron) blast profile.

For non-immersion service, clean by power tool or hand tool in accordance with SSPC-SP 3 or SSPC-SP 2, respectively, to a cleanliness defined by SSPC-St 2 pictorial standards. Alternatively, for more severe environments, abrasive blast per SSPC-SP 7 (brush-off blast) to a degree of cleanliness defined by SSPC-Sa 1 pictorial standards. Loose edges of old coating must be removed by power tool or hand tool cleaning. Feathering of tight edges of old coating will Itnprove final appearance.

MIXING: Combine Part A with Part B and power mlx until uniform. May be thinned up to 57. by volume with CARBOLINE Thinner #92. Do not mix partial kits.

	1.25 Gal. Kit	5 Gal. Kit
CARBOMASTIC 242 Part A	1 gallon	4 gallons
CARBOMASTIC 242 Part B	1 quart	1 gallon

NOTE: Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT UFE: This material is moisture sensitive. Moisture contamination will shorten pot life and cause gelation. Pot life ends when coating becomes too viscous to use.

Temperature	Pot Life
90° F (32° C)	1 Hour
75° F (24° C)	3 Hours
35° F (2° C)	6 Hours

APPUCATION TEMPERATURES:

	Material	Sutfaces	Ambient	Humidity
Normal	45-75° F (7-24° C)	20-75° F (-7-24° C)	20-75° F (-7-24° G)	500/.
Minimum"	3!YF(2" C)"	0"F(-18" C)	OF(-18'C)	o%
Maximum**	90° F (32° C)	100° F (38° C)	90° F (32' C)	80"/0

Do not apply when the surface temperature is less than 5. F (2° C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

*CARBOMASTIC 242 will cure at temperatures as low as 0" F (-l&C); however for mixing purposes, a minimum material temperature of 35° F (2° C) is recommended.

•*NO~ in ve~ warm conditions it is necessary tO COnWOI film thickness, especially in overlap areas, as excessive thickness may cause blistering.

SPRAY: Use sufficient air volume for correct operation equipment.

Use a 5O% overlap with each pass of the gun. On irregul :.surfaces . coat the edges first, making an extra pass later.

NOTE: The following equipment has been found suitabl however,equivalent equipment may be substituted.

Conventional: Use a 1/2 " minimum I.D. material hose. Ho gun approximately 12-14 inches from the surface and at right angle to the surface.

Mfr. & Gun	Fluid Tip	Air Ca
Binks #18 m #62	67	67PE
DeVilbiss P-MBC or J G A	D approx. .086 I.D.	64

Airless; Use a 3/8 minimum I.D. material hose. Hold gu approximately 18-20 inches from the surface and at a rig angle to the surface.

Mfr. & Gun	Pump*
DeVilbiss .JGB-507	QFA-514 or QFA-51
Graco 205-591	President 30:1 or Bulidog 30:1
Binks Model 700	B5-18 or B8-36

● Teflon packings are recommended and are available fro manufacturer.

Use a .019 to .024" tip with 2400 psi.

BRUSH OR ROLLER: Use clean, short-bristled brush medium nap roller. Work coating into all irregularitie Brush or roller application may result in less bright uniform aluminum color. Two coats may be required achieve proper film thickness.

DRYING TIMES:

Temperature	Dry *to* Handle orto Topcoat	Before Placing into Service
0' F (-18'" C)	36 hours	9 days
20" F (-7 C)	24 hours	6 days
5UF(10" C)	12 hours	3 days
7s" F (2T C)	4 hours	24 hours
90' F (32 C)	1 hour	6 hours

CLEANUP Use CARBOLINE Thinner #2.

STORAGE CONDITIONS: (Store Indoors)

Temperature: 35-110° F (2-43° C) Humidity: 0-7(

Avoid storing Part B containers once opened. Material moisture reactive and will gel upon exposure.

GENERIC TYPE: Epoxy-amine. Part A and Part B mixed prior to application.

GENERAL PROPERTIES: A high build, economical system generally consisting of three coats and exhibiting excellent chemical resistance. Easy to apply by spray. Primer contains inhibitive pigments to prevent undercutting erosion. Qualified as a two-coat system under MIL-P-23236 Class 1, Type 1.

RECOMMENDED USES: Can be used for tank lining and heavy-duty protection of structural steel and concrete in chemical environments.

NOT RECOMMENDED FOR: Continuous immersion in water over 130°F (54°C), strong mineral and organic acids.

CHEMICAL RESISTANCE GUIDE:

Exposure	Immersion
Acids/Mineral	Good-Excellent
Alkalies	Excellent
Solvents	Good-Excellent
Salt	Excellent
Water	Excellent

TEMPERATURE RESISTANCE: (non-immersion) Immersion temperature resistance depends on exposure. Metal tanks must be insulated when operating temperatures exceed 140°F (60°C).
Continuous: 200°F (93°C)

FLEXIBILITY: Poor **WEATHERING:** Excellent (Chalks)

ABRASION RESISTANCE: Very good.

SUBSTRATES: Apply over suitably prepared steel, concrete or others as recommended.

TOPCOAT REQUIRED: None for CARBOLINE 187 HFP Finish. CARBOLINE 187 HFP Primer may be topcoated with epoxies, modified phenolics, or other generic types as recommended.

COMPATIBILITY WITH OTHER COATINGS: CARBOLINE 187 HFP Finish may be applied over catalyzed epoxies, phenolics or other generic types as recommended. Apply CARBOLINE 187 HFP Primer directly to substrate. For concrete, use an epoxy surfacer such as CARBOLINE 195 Surfacer.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
CARBOLINE 187 HFP Primer & Finish	67% ± 2%

RECOMMENDED DRY FILM THICKNESS PER COAT AND SYSTEM:
1c. CARBOLINE 187 HFP Primer 5 mils (125 microns)
2c. CARBOLINE 187 HFP Finish 5 mils/ct (125 microns)

THEORETICAL COVERAGE PER MIXED GALLON*:
1075 mil sq. ft. (26.8 sq.m/1 at 25 microns)
215 sq. ft. at 5 mils (5.4 sq.m/1 at 125 microns)

***NOTE:** Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE:
Part A - 24 months minimum when stored at 75°F (24°C)
Part B - 12 months minimum when stored at 75°F (24°C)

COLORS:
Primer - Brick Red only.
Finish - Available in a variety of colors. Consult your local Carboline representative or Carboline Customer Service for availability.

GLOSS: Flat.

Prices may be obtained from Carboline sales representative or main office.

APPROXIMATE SHIPPING WEIGHT:

	1's	5's
CARBOLINE 187 HFP (Primer & Finish)	18 lbs. (8.2 kg)	84 lbs. (38.2 kg)
CARBOLINE Thinner #15	9 lbs. (4.1 kg)	45 lbs. (20.4 kg)
CARBOLINE Thinner #33	9 lbs. (4.1 kg)	45 lbs. (20.4 kg)
CARBOLINE Thinner #41	9 lbs. (4.1 kg)	45 lbs. (20.4 kg)

FLASH POINT: (Pensky-Martens Closed Cup)

CARBOLINE 187 HFP Finish Part A	104°F (40°C)
CARBOLINE 187 HFP Primer Part A	104°F (40°C)
CARBOLINE 187 HFP Part B	108°F (42°C)
CARBOLINE Thinner #15	77°F (25°C)
CARBOLINE Thinner #33	103°F (39°C)
CARBOLINE Thinner #41	110°F (43°C)

May 85 Replaces Dec. 82

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining co surface preparation, mixing instructions and application procedure. It is assumed that the proper product recommendations have made. These instructions should be followed closely to obtain the maximum service from the materials.

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SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 in accordance with SSPC-SP 1.

Steel: Dry abrasive blast to a White Metal Finish in accordance with SSPC-SP 5-82 (Swedish Standards Sa 3) to a degree of cleanliness in accordance with NACE #1 to obtain a 2-3 mil (50-75 micron) blast profile. For non-immersion service, dry abrasive blast to a Commercial Grade Finish in accordance with SSPC-SP 6-82 (Swedish Standards Sa 2) to a degree of cleanliness in accordance with NACE #3 to obtain a 2-3 mil (50-75 micron) blast profile.

Concrete: Remove fins and other protrusions by stoning, sanding or grinding. Concrete must be cured at least 28 days at 70°F (21°C) and 50% R.H. or equivalent time. Remove form oils, incompatible curing agents and hardeners by abrasive blasting. IMMERSION SERVICE - Abrasive blast to open all voids and obtain a surface similar to medium grit sandpaper (horizontal surfaces may be acid etched). Blow or vacuum off sand and dust. NON-IMMERSION SERVICE - Horizontal surfaces must be acid etched or abrasive blasted to remove laitance. For other surfaces blow off with compressed air to remove dust. CARBOLINE 187 HFP Finish can be applied over a recommended surfacer.

MIXING: Mix separately, then combine and mix in the following proportions:

	1 Gal. Kit	5 Gal. Kit
CARBOLINE 187 HFP Part A	.8 gal.	4 gals.
CARBOLINE 187 HFP Part B	.2 gal.	1 gal.

Thin up to 25% by volume with CARBOLINE Thinner #33 or #15. Use CARBOLINE Thinner #33 if flash point over 100°F (38°C) is required and dry time between coats is less than seven days at 75°F (24°C). For between coat dry times longer than seven days, use CARBOLINE Thinner #41 up to 15% by volume.

NOTE: Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty whether express or implied.

POT LIFE: Four hours at 75°F (24°C) and less at higher temperatures. Pot life ends when coating loses body and begins to sag.

APPLICATION TEMPERATURES:

	Material	Surfaces
Normal	65–85°F (18–29°C)	65–85°F (18–29°C)
Minimum	55°F (13°C)	50°F (10°C)
Maximum	90°F (32°C)	110°F (43°C)
	Ambient	**Humidity**
Normal	65–84°F (18–29°C)	30–60%
Minimum	50°F (10°C)	0%
Maximum	100°F (38°C)	85%

Do not apply when the surface temperature is less than 5°F (2°C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use sufficient air volume for correct operation of equipment.

Use a 50% overlap with each pass of the gun. On irreg surfaces, coat the edges first, making an extra pass later

NOTE: The following equipment has been found suita however, equivalent equipment may be substituted.

Conventional: Use 3/8" minimum I.D. material hose. H gun approximately 12-14 inches from the surface and right angle to the surface.

Mfr. & Gun	Fluid Tip	Air
Binks #18 or #62	63C	63
DeVilbiss P-MBC or JGA	FF approx. .052" I.D.	7C

Airless: Use 3/8" minimum I.D. material hose. Hold gun proximately 18-20 inches from the surface and at a right ar to the surface.

Mfr. & Gun	Pump*
DeVilbiss JGB-507	QFA-514 or QFA-519
Graco 205-591	President 30:1 or Bulldog 3
Binks Model 700	B5-18 29:1 or B8-36 37:1

*Teflon packings are recommended and are available fi pump manufacturer. Use a .015 - .019" tip with 2200 psi.

BRUSH OR ROLLER: Recommended for small areas touch-up only. Use maximum amount of thinner.

DRYING TIMES:

Between coats:	4 days	50°F (10°C)
	2 days	60°F (16°C)
	24 hours	75°F (24°C)
	12 hours	90°F (32°C)
Final cure:	15 days	75°F (24°C)
	7 days	90°F (32°C)
	4 hours	at 75°F (24°C) followe
	20 hours	at 150°F (66°C)

Force curing is recommended for tank linings.

Excessive film thickness or poor ventilating conditions req longer dry times and could result in premature failure in treme cases.

Excessive humidity or condensation on the surface du curing may result in a surface haze or blush; any haze blush should be removed by water washing before recoati

VENTILATION & SAFETY: When used as a tank lining o enclosed areas, thorough air circulation must be used du and after application until the coating is cured. The ventilat system should be capable of preventing the solvent va concentration from reaching the lower explosion limit for solvents used. In addition, to insure proper ventilation, fr air respirators or fresh air hoods must be used by all appli tion personnel. Where flammable solvents exist, explosi proof lighting must be used. Hypersensitive persons sho wear clean, protective cream on face, hands and all expos areas.

CLEAN UP: Use CARBOLINE Thinner #2 or CARBOLI Thinner #41.

STORAGE CONDITIONS: Store indoors.
Temperature: 40-110°F (4–43°C) **Humidity:** 0–10

CAUTION: CONTAINS COMBUSTIBLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WE FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPME AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHE EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AI NONSPARKING SHOES.

product data sheet

944

GENERIC TYPE: Epoxy-polyamide. Part A and Part B mixed prior to application.

GENERAL PROPERTIES: CARBOLINE 190 HB has excellent resistance to salts, water, alkalies and weathering. Has very good resistance to mild acids and solvents. Can be applied at a dry film thickness of 4-6 mils (100-150 microns) in one coat. The cured film is tough and abrasion resistant.

RECOMMENDED USES: CARBOLINE 190 HB can be used over Carboline inorganic zinc primers. Particularly recommended as an exterior coating for tank farms and miscellaneous equipment where uniformity of color and resistance to salt, alkalies and weathering exposures is required.

NOT RECOMMENDED FOR: Immersion service, strong acid exposures or areas where chalking is undesirable.

CHEMICAL RESISTANCE GUIDE:

Exposure	Splash and Spillage	Fumes
Acids	Fair	Very Good
Alkalies	Excellent	Excellent
Solvents	Good	Very Good
Salt	Excellent	Excellent
Water	Excellent	Excellent

TEMPERATURE RESISTANCE: (non-immersion)

Continuous:	200°F (93°C)
Non-continuous:	250°F (121°C)

FLEXIBILITY: Fair

WEATHERING: Very Good (chalks – results in fading most noticeable in dark colors).

ABRASION RESISTANCE: Very Good

SUBSTRATES: Apply over suitably primed metal, concrete or other surfaces as recommended.

TOPCOAT REQUIRED: Normally none. May be topcoated as recommended to upgrade weathering resistance, or for higher gloss.

COMPATIBILITY WITH OTHER COATINGS: May be applied directly over inorganic zincs, weathered galvanizing, catalyzed epoxies, phenolics or other coatings as recommended. A mist coat of CARBOLINE 190 HB is recommended when applied over inorganic zincs to minimize bubbling. Consult Carboline Technical Service for specific recommendations.

Oct. 84 Replaces Aug. 83

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL.

	By Volume
CARBOLINE 190 HB	59% ± 3%

RECOMMENDED DRY FILM THICKNESS PER COAT: 4-6 mils (100-150 microns)

THEORETICAL COVERAGE PER MIXED GALLON*:
946 mil sq. ft. (23.6 sq. m²/l at 25 microns)
189 sq. ft. at 5 mils (4.7 sq. m²/l at 125 microns)

*NOTE: Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: 24 months minimum when stored at 75°F (24°C)

COLORS: Available in a variety of colors. Consult your local Carboline representative or Carboline Customer Service for availability.

If long term color retention is desired for esthetic reasons, topcoat with CARBOLINE 134 or other recommended coating.

CARBOLINE 190 HB Tank Finish, White 0854, is a freely chalking self-cleaning white product. Consult separate Product Data Sheet for specific recommendations.

GLOSS: Flat (chalks upon weathering).

Prices may be obtained from Carboline sales representative or main office.

APPROXIMATE SHIPPING WEIGHT

	2's	10's
CARBOLINE 190 HB	27 lbs (12.3 kg)	132 lbs. (59.9 kg)
CARBOLINE Thinner #15	9 lbs. in 1's (4.1 kg)	45 lbs. in 5's (20.4 kg)
CARBOLINE Thinner #33	9 lbs. in 1's (4.1 kg)	45 lbs. in 5's (20.4 kg)

FLASH POINT: (Pensky-Martens Closed Cup)

CARBOLINE 190 HB Part A	58°F (14°C)
CARBOLINE 190 HB Part B	73°F (23°C)
CARBOLINE Thinner #15	77°F (25°C)
CARBOLINE Thinner #33	101°F (38°C)

These instructions are not intended to show product recommendations for specific use. They are issued as an aid in determining cor surface preparation, mixing instructions, and application procedure. It is assumed that the proper product recommendations have been m. These instructions should be followed closely to obtain the maximum service from the materials.

944

SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 or toluol in accordance with SSPC-SP 1-82.

Steel: Apply over clean, dry recommended primers.

Concrete: Apply over clean, dry recommended surfacer or primer.

MIXING: Power mix separately, then combine and mix in the following proportions:

	2 Gal. Kit	10 Gal. Kit
CARBOLINE 190 HB Part A	1 gallon	5 gallons
CARBOLINE 190 HB Part B	1 gallon	5 gallons

Thin up to 25% by volume with CARBOLINE Thinner #15 For hot or windy conditions, use CARBOLINE Thinner #33.

NOTE: Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE: Eight hours at 75°F (24°C) and less at higher temperatures. Pot life ends when coating loses body and begins to sag.

APPLICATION TEMPERATURES:

	Material	Surfaces
Normal	65-85°F (18-29°C)	65-85°F (18-29°C)
Minimum	50°F (10°C)	50°F (10°C)
Maximum	90°F (32°C)	140°F (60°C)
	Ambient	**Humidity**
Normal	60-90°F (16-32°C)	65%
Minimum	50°F (10°C)	0%
Maximum	120°F (49°C)	85%

Do not apply when the surface temperature is less than 5°F (2°C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use sufficient air volume for correct operation of equipment.

Use a 50% overlap with each pass of the gun. On irregu surfaces, coat the edges first, making an extra pass la

NOTE: The following equipment has been found suitat however, equivalent equipment may be substituted.

Conventional: Use 3/8" minimum I.D. material hose. Hc gun approximately 12-14 inches from the surface and a right angle to the surface.

Mfr. & Gun	Fluid Tip	Air Ca
Binks 18 or #62	66	63PB
DeVilbiss MBC or JGA	E	704
	approx. .070" I.D.	

Airless: Use 3/8" minimum I.D. material hose. An inli 60 mesh filter is suggested. Hold gun approximately 18- inches from the surface and at a right angle to the surface

Mfr. & Gun	Pump*
DeVilbiss JGB or JGN	QFA-514 or QFA-519
Graco 205-591	President 30:1 or Bulldog 30:1
Binks Model 700	B5-18 29:1 or B8-36 37:1

*Teflon packings are recommended and are available fro pump manufacturer

Use a .017-.021" tip with 2200 psi.

BRUSH OR ROLLER: Recommended for small areas touch-up only. Use medium bristle brush or good quali short nap roller. Avoid rebrushing and rerolling. Use CA Thinner #33 up to 25% by volume for be results. Two coats may be required to obtain desir appearance

DRYING TIMES:

Between coats:	50°F (10°C)	3 days
	75°F (24°C)	18 hours
	90°F (32°C)	10 hours
Final cure:	50°F (10°C)	1 week
	75°F (24°C)	4 days
	90°F (32°C)	2 days

CLEAN UP: Use CARBOLINE Thinner #2 or MEK.

STORAGE CONDITIONS: (store indoors)
Temperature: 40-110°F (4-43°C) Humidity: 0-100

product data sheet

0916

GENERIC TYPE: A two component epoxy-polyamide.

GENERAL PROPERTIES: A tank lining system for fresh water, including potable water service.

- Flexibility — Good
- Weathering — Very Good (chalks)
- Very good abrasion resistance
- Complies with AWWA Standard D102 For Painting Steel Water Tanks, Inside Paint System No. 1, 3.2(3)
- USDA acceptable for indirect food contact surfaces

RECOMMENDED USES: CARBOLINE 191 Primer and Finish is recommended for use as a tank lining and heavy duty service system for protection of steel and concrete in water

NOT RECOMMENDED FOR: Immersion in potable water over 130°F (54°C), strong mineral and organic acids, or solvents.

TYPICAL CHEMICAL RESISTANCE:

Exposure	Immersion	Splash and Spillage
Acids	NR	NR
Alkalies	Excellent to 150° F (66° C)	Excellent
Solvents	NR	Poor-Fair
Salt	Excellent to 150° F (66° C)	Excellent
Water	Excellent to 130° F (54° C)	Excellent
Sugar Solutions	Excellent to 150° F (66° C)	Excellent

TEMPERATURE RESISTANCE: Not affected by steam cleaning. See specific exposure for temperature resistance.

SUBSTRATES: CARBOLINE 191 Primer may be applied to properly prepared steel. Carboline 191 Finish is normally applied over Carboline 191 Primer, properly prepared or surfaced concrete, or other substrates as recommended.

COMPATIBLE COATINGS: May be applied over inorganic zinc primers such as CARBO ZINC 11. When applied over inorganic zincs a mist coat is required to minimize bubbling. CARBOLINE 191 Primer may be topcoated with catalyzed epoxies, modified phenolics and others as recommended. For specific recommendations, consult Carboline Technical Service Department.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
CARBOLINE 191 Primer	71% ± 2%
CARBOLINE 191 Finish	69% ± 2%

VOLATILE ORGANIC CONTENT:
The following are nominal values:
As supplied:
Primer: 1.93 lbs./gal. (231 g/l)
Finish: 2.05 lbs./gal. (246 g/l)

Thinned:
Primer with Carboline Thinner #202

% Thinned	Fluid Ounces/Gal.	Pounds/ Gallon	Grams Liter
15%	19	2.61	313
35%	42	3.23	387
Finish with Carboline Thinner #202			
15%	19	2.72	326
33%	42	3.32	398

RECOMMENDED SYSTEM: Normally one coat CARBOLINE 191 Primer at 5 mils (125 microns) dry film thickness, plus one coat CARBOLINE 191 Finish at 5 mils (125 microns) dry film thickness. Service life is increased with two coats of 191 Finish. An alternate system is one or two coats CARBOLINE 191 Finish over CARBO ZINC 11. Do not exceed 6 mils dry film thickness per coat when applied over inorganic zinc primers. CARBOLINE 191 Finish is recommended direct-to-metal if a color other than red is desired as a first coat.

THEORETICAL COVERAGE PER MIXED GALLON*:
CARBOLINE 191 Primer
1139 mil sq. ft. (28.4 sq. m/l at 25 microns)
228 sq. ft. at 5 mils (5.7 sq. m/l at 125 microns)
CARBOLINE 191 Finish
1107 mil sq. ft. (27.6 sq. m/l at 25 microns)
221 sq. ft. at 5 mils (5.5 sq. m/l at 125 microns)

*Mixing and application losses will vary and must be taken into consideration when estimating job requirements.

STORAGE CONDITIONS: Store Indoors
Temperature:* 45-110° F (7-43° C) Humidity: 0-90%

*Return to minimum material temperature of 55° F (13° C) before use.

SHELF LIFE: Twenty-four months when stored at 75° F (24° C).

COLORS: CARBOLINE 191 Primer — Brick Red only.
CARBOLINE 191 Finish — White (S800), Gray (C703) and (C705) are standard. Other colors are available on special order.

GLOSS: CARBOLINE 191 Finish: Semi-gloss

Prices may be obtained from your local Carboline Sales Representative or Customer Service Representative.

APPROXIMATE SHIPPING WEIGHT:

	1½ Gal. Kit	7½ Gal. Kit
CARBOLINE 191 Primer	20 lbs. (9 kg)	94 lbs. (43 kg)
CARBOLINE 191 Finish	20 lbs. (9 kg)	94 lbs. (43 kg)
CARBOLINE Thinner #202	8 lbs. (4 kg) in 1's	37 lbs. (17 kg) in 5's

FLASH POINT: (Pensky-Martens Closed Cup)

CARBOLINE 191 Primer Part A	68° F (20° C)
CARBOLINE 191 Finish Part A	67° F (19° C)
CARBOLINE 191 Part B	70° F (21° C)
CARBOLINE Thinner # 202	38° F (3° C)

AUG. 88 Replaces March 87

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining correct surface preparation, mix instructions and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to obt the maximum service from the materials

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SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner # 2 or Surface Cleaner # 3 (refer to Surface Cleaner # 3 instructions) in accordance with SSPC-SP 1.

Steel: Abrasive blast to a Near White Metal Finish in accordance with SSPC-SP 10 to a degree of cleanliness in accordance with NACE # 2 to obtain a 1-2 mil (25-50 micron) blast profile. Weld slag must be removed and welds ground to a rounded contour. Welds should be striped with Carboline 191 Primer before the finish is applied.

Concrete: Do not coat concrete treated with hardening solutions unless a test patch indicates satisfactory adhesion. Do not apply coating unless concrete has cured at least 28 days at 70° F (21° C) and 50% R.H. or equivalent time. Apply to properly prepared dry concrete that was acid etched and neutralized or thoroughly and uniformly sweep blasted or over a clean dry surface.

MIXING: Mix separately, then combine and mix in the following proportions:

	1½ Gal. Kit	7 ½ Gal. Kit
CARBOLINE 191 Primer Part A or CARBOLINE 191 Finish Part A	1 gallon	5 gallons
CARBOLINE 191 Part B	½ gallon	2 ½ gallons

THINNING: Normally thinned at 15% by volume for spray application:

May be thinned up to 33% by volume with CARBOLINE Thinner #202.

Refer to Specification Data for VOC information.

Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE: Two hours at 75°F (24°C) and less at higher temperatures. Pot life ends when coating loses body and begins to sag.

APPLICATION TEMPERATURES:

	Material	Surfaces	Ambient	Humidity
Normal	65-85° F (18-29° C)	65-85° F (18-29° C)	65-85° F (18-29° C)	30-60%
Minimum	55° F (23° C)	50° F (10° C)	50° F (10° C)	0%
Maximum	90° F (32° C)	110° F (43° C)	110° F (43° C)	90%

Do not apply when the surface temperature is less than 5° F or 2° C above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: The following spray equipment has been found suitable and is available from manufacturers such as Binks, DeVilbiss and Graco.

Conventional: Pressure pot equipped with dual regulato ⅜" I.D. minimum material hose, .070" I.D. fluid tip a appropriate air cap.

Airless:
Pump Ratio: 30:1 (min.)*
GPM Output: 3.0 (min.)
Material Hose: 3/8"I.D. (min.)
Tip Size: .017-.021"
Output psi: 2300-2500
Filter Size: 60 mesh

*Teflon packings are recommended and are available fro the pump manufacturer.

BRUSH OR ROLLER: For striping of welds,touch-up or sm areas only. Use a natural bristle brush applying with f strokes. Avoid rebrushing. If rolled, use a short nap moh roller with phenolic core. Avoid rerolling.

DRYING TIMES: These times are based on recommended c film thickness.

Temperature	Between Coats	Final Cure* For Immersic Service
50° F (10° C)	5 days	NR
60° F (16° C)	2 days	3 weeks
75° F (24° C)	18 hours	10 days
90° F (32° C)	12 hours	7 days

*Final cure temperatures below 60 °F are not recommend for tank linings.

Force curing at 150° F (66° C) is possible after an initial peri of 18 hours at 75° F (24° C).

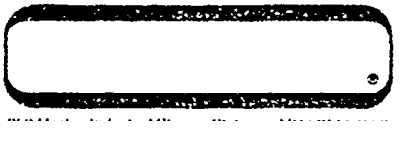
Consult Carboline Tank Lining guide or Technical Servi Department prior to use as a tank lining.

VENTILATION & SAFETY: WARNING: Vapors may cause e plosion. When used as a tank lining or in enclosed area thorough air circulation must be present during and aft application until the coating is cured. The ventilation syste should be capable of preventing the solvent vapor conce tration from reaching the lower explosion limit for the s vents used. In addition fresh air respirators or fresh air hoo must be used by all application personnel. Non-sparkin non-conductive equipment and clothing must be used. E plosion-proof lighting equipment must be used. Hypersen tive persons should wear clean protective clothing, glov and/or protective cream on face, hands and all expos areas.

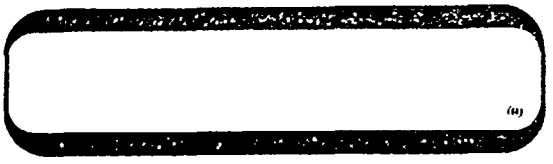
CLEANUP: Use CARBOLINE Thinner # 2.

CAUTION: READ AND FOLLOW ALL CAUTION STAT MENTS ON THIS PRODUCT DATA SHEET AND ON TH MATERIAL SAFETY DATA SHEET FOR THIS PRODUCT.

CAUTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEAR FRESH AIRLINE RESPIRATORS HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMENT AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHERE EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AND NONSPARKING SHOES.



product data sheet



GENERIC TYPE: Two component, cross-linked epoxy.

GENERAL PROPERTIES: CARBOLINE 801 is a self priming, high build, semi-gloss finish available in a wide variety of colors. Can be applied by spray, brush or roller over hand or power tool cleaned steel and is compatible with most existing coatings and tightly adhered rust. The cured film is tough and abrasion resistant and provides an easily cleanable, esthetic surface. Features include:

- Single coat corrosion protection.
- Good weathering resistance.
- Good flexibility and lower stress upon curing than most epoxy coatings.
- Excellent tolerance of damp (not wet) substrates.
- Can be spray applied up to 8 mils dry in one coat.
- Has a higher flash point than most epoxy coatings (over 110°F, including recommended Carboline Thinner).
- Meets the most stringent VOC (Volatile Organic Content) regulations.

RECOMMENDED USES: Recommended as a general, plant wide, maintenance coating for tanks, structural steel or miscellaneous equipment in industrial environments that include Chemical Processing, Pulp and Paper, Water and Waste Water Treatment and Power Generation among others. May be used as a single coat, shop applied system for new structural steel and equipment that will receive mild chemical exposures. Two coats of CARBOLINE 801 are recommended for use in more severe environments. Consult Carboline Technical Service Department for other specific uses.

NOT RECOMMENDED FOR: Immersion service, splash and spillage of very strong solvents or concentrated acids.

TYPICAL CHEMICAL RESISTANCE:

Exposure	Splash and Spillage	Fumes
Acids	Good	Very Good
Alkalies	Good	Excellent
Solvents	Very Good	Excellent
Salt Solutions	Excellent	Excellent
Water	Excellent	Excellent

TEMPERATURE RESISTANCE:
Continuous: 200°F (93°C)
Non-continuous: 250°F (121°C)

SUBSTRATES: Apply over suitably prepared metal, concrete, or other surfaces as recommended.

COMPATIBLE COATINGS: May be used over most generic types of coatings which are tightly adhering and properly prepared. A test patch is recommended for use over existing coatings. May be topcoated to upgrade weathering resistance. Consult Carboline Technical Service Department for specific recommendations.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:*

	By Volume
CARBOLINE 801	76% ± 2%

VOLATILE ORGANIC CONTENT:*
As Supplied: 1.74 lbs./gal.(208 gm/liter — Color White (S800)
Thinned: The following are nominal values utilizing CARBOLINE Thinner #4.

% Thinned	Fluid Ounces/Gal.	Pounds/ Gallon	Grams/ Liter
6%	8	2.08	250
12%	16	2.37	284
25%	32	2.88	345

*Varies with color

RECOMMENDED DRY FILM THICKNESS PER COAT:
4-6 mils (100-150 microns) for use in mild environments.
6-8 mils (150-200 microns) for use over light tight rust. In more severe environments a second coat of 4-6 mils(100-150 microns) is recommended.

THEORETICAL COVERAGE PER MIXED GALLON:
1219 mil sq. ft. (30.4 sq. m/l at 25 microns)
244 sq. ft. at 5 mils(6.0 sq. m/l at 125 microns)
Mixing and application losses will vary and must be taken into consideration when estimating job requirements.

STORAGE CONDITIONS: Store Indoors.
Temperature: 40-95°F (4-35°C)
Humidity: 0-90%

SHELF LIFE: Twenty-four months minimum when stored at 75°F (24°C).

COLORS: Available in Carboline Color Chart Colors. Metallic aluminum colors are available upon special request. Some colors may require two coats for adequate hiding. Consult your local Carboline representative or Carboline Customer Service for availability.

GLOSS: Semi-gloss (Epoxies lose gloss and eventually chalk in sunlight exposure).

Prices may be obtained from your Carboline sales representative or Carboline Customer Service Department.

APPROXIMATE SHIPPING WEIGHT:

	2's	10's
CARBOLINE 801	28 lbs. (12 kg)	135 lbs. (61 kg)
CARBOLINE Thinner #4	9 lbs. (4 kg) in 1's	45 lbs. (20 kg) in 5's

FLASHPOINT: (Pensky-Martens Closed Cup)

CARBOLINE 801 Part A	110°F (43°C)
CARBOLINE 801 Part B	115°F (46°C)
CARBOLINE Thinner #4	110°F (43°C)

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining correct surface preparation, mi instructions and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to ob the maximum service from the materials.

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SURFACE PREPARATION: Remove oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 or SURFACE CLEANER #3 (Refer to Surface Cleaner #3 instructions) in accordance with SSPC-SP 1.

Steel: For mild environments Power Tool or Hand Tool Clean in accordance with SSPC-SP 3 or SSPC-SP 2, respectively to produce a rust-scale free surface.

For more severe environments, abrasive blast to a Commercial Finish in accordance with SSPC-SP 6 (or NACE #3) to obtain a 1-1/2 — 3 mil (40-75 micron) blast profile.

Concrete: Apply over clean, dry recommended surfacer. Can be applied directly to dry concrete where an uneven surface can be tolerated. Remove laitance by abrasive blasting or other means.

Do not coat concrete treated with hardening solutions unless test patches indicate satisfactory adhesion. Do not apply coating unless concrete has cured at least 28 days at 70°F (21°C) and 50% R.H. or equivalent time.

MIXING: Mix separately, then combine and mix in the following proportions:

	2 Gal. Kit	10 Gal. Kit
CARBOLINE 801 Part A	1 gallon	5 gallons
CARBOLINE 801 Part B	1 gallon	5 gallons

DO NOT MIX PARTIAL KITS.

THINNING: For spray applications, may be thinned up to 12% (16 fl. oz./gal.) by volume with CARBOLINE Thinner #4.

For brush and roller application, may be thinned up to 25% (32 fl oz./gal.) by volume with CARBOLINE Thinner #4.

Refer to Specification Data for VOC information.

Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE: Four hours at 75°F (24°C) and less at higher temperatures. Pot life ends when coating loses body and begins to sag. Thinning rates above 12% will shorten the working time to two hours due to reduced film build.

APPLICATION CONDITIONS:

	Material	Surfaces	Ambient	Humidity
Normal	60-85°F (16-29°C)	60-85°F (16-29°C)	60-85°F (16-29°C)	0-90%
Minimum	50°F (10°C)	50°F (10°C)	50°F (10°C)	0%
Maximum	90°F (32°C)	135°F (57°C)	110°F (43°C)	90%

Do not apply when the surface temperature is less than 5°F (2 above the dew point.

Special thinning and application techniques may be requi above or below normal conditions.

SPRAY: This is a high solids coating and may require slight adj ments in spray techniques. Wet film thicknesses are easily quickly achieved. The following spray equipment has b found suitable and is available from manufacturers such Binks, DeVilbiss and Graco.

Conventional: Pressure pot equipped with dual regulators, I.D. minimum material hose, .070" I.D. fluid tip and appropr air cap.

Airless:
Pump Ratio: 30:1 (min.)*
GPM Output: 3.0 (min.)
Material Hose: 3/8" I.D. (min.)
Tip Size: .017-.021"
Output psi: 1900-2100
Filter Size: 60 mesh

*Teflon packings are recommended and are available from pump manufacturer.

BRUSH OR ROLLER: Use a medium bristle brush, or good qua short nap roller, avoid excessive rebrushing and rerolling. T coats may be required to obtain desired appearance and rec mended DFT. For best results, tie-in within 10 minutes at 7 (24°C).

DRYING TIMES: These times are at 4 mils (100 microns) dry f thickness. Higher film thicknesses will lengthen cure times.

Dry to Touch at 75°F (24°C)–3-1/2 hours
Dry to Handle at 75°F (24°C)–6-1/2 hours

	Between Coats	Final Cu
50°F (10°C)	36 hours	3 days
60°F (16°C)	24 hours	2 days
75°F (24°C)	12 hours	24 hou
90°F (32°C)	6 hours	12 hou

CLEANUP: Use CARBOLINE Thinner #2.

CAUTION: READ AND FOLLOW ALL CAUTION STATEMEN ON THIS PRODUCT DATA SHEET AND ON THE MATERI SAFETY DATA SHEET FOR THIS PRODUCT.

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CAUTION: CONTAINS COMBUSTIBLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEA FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMEN AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHER EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AN NONSPARKING SHOES.

350 Hanley Industrial Ct. • St. Louis, MO 63144-1599

product data sheet

GENERIC TYPE: Two component, cross-linked epoxy.

GENERAL PROPERTIES: CARBOLINE 890 is a high solids, high gloss, high build epoxy topcoat that can be applied by spray, brush, or roller. The cured film provides an easily cleanable and esthetic surface. Available in a wide variety of clean, bright colors. Features include:

- Good flexibility and lower stress upon curing than most epoxy coatings.
- Very good weathering resistance for a high gloss epoxy
- Very good abrasion resistance.
- Excellent tolerance of damp(not wet) substrates.
- Excellent performance in wet exposures.
- Meets the most stringent VOC (Volatile Organic Content) regulations.

RECOMMENDED USES: Recommended where a high performance, attractive, chemically resistant epoxy topcoat is desired. Offers outstanding protection for interior floors, walls, piping, equipment and structural steel or as an exterior coating for tank farms, railcars, structural steel and equipment in various corrosive environments. Recommended industrial environments include Chemical Processing, Offshore Oil and Gas, Food Processing and Pharmaceutical, Water and Waste Water Treatment, Pulp and Paper, Power Generation among others. May be used as a two coat system direct to metal or concrete for Water and Municipal Waste Water immersion. CARBOLINE 890 has been accepted for use in areas controlled by USDA regulations for incidental food contact and passes the current EPA extractables test for potable water tank linings. Consult Carboline Technical Service Department for other specific uses.

NOT RECOMMENDED FOR: Strong acid or solvent exposures, or immersion service other than water.

TYPICAL CHEMICAL RESISTANCE:

Exposure	Splash and Spillage	Fumes
Acids	Very Good	Very Good
Alkalies	Excellent	Excellent
Solvents	Very Good	Excellent
Salt Solutions	Excellent	Excellent
Water	Excellent	Excellent

TEMPERATURE RESISTANCE:
Continuous: 200° F (93° C)
Non-continuous: 250° F (121° C)

At 300° F, coating discoloration and loss of gloss is observed, without loss of film integrity.

SUBSTRATES: Apply over suitably prepared metal, concrete, or other surfaces as recommended.

COMPATIBLE COATINGS: May be applied directly over inorganic zincs, weathered galvanizing, catalyzed epoxies, phenolics or other coatings as instructed. A test patch is recommended before use over existing coatings. May be used as a tiecoat over inorganic zincs. A mist coat of CARBOLINE 890 is required when applied over inorganic zincs to minimize bubbling. May be topcoated to upgrade weathering resistance. Not recommended over chlorinated rubber or latex coatings. Consult Carboline Technical Service for specific recommendations.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:*

	By Volume
CARBOLINE 890	75% ± 2%

VOLATILE ORGANIC CONTENT:*
As Supplied: 1.78 lbs./gal.(214 gm/liter)
Thinned: The following are nominal values utilizing:
CARBOLINE Thinner # 2 (spray application)

% Thinned	Fluid Ounces/Gal.	Pounds/ Gallon	Grams/ Liter
5%	8	2.08	250.

CARBOLINE Thinner #33 (brush & roller application)

12%	16	2.60	311

*Varies with color

RECOMMENDED DRY FILM THICKNESS PER COAT:
4-6 mils(100-150 microns)

5-7 mils (125-175 microns) DFT for a more uniform gloss over inorganic zincs.

Dry film thicknesses in excess of 10 mils(250 microns) per coat are not recommended. Excessive film thickness over inorganic zinc may increase damage during shipping or erection.

THEORETICAL COVERAGE PER MIXED GALLON:
1203 mil sq. ft. (30 sq. m/l at 25 microns)
241 sq. ft. at 5 mils(6.0 sq. m/l at 125 microns)
Mixing and application losses will vary and must be taken into consideration when estimating job requirements.

STORAGE CONDITIONS: Store Indoors
Temperature: 40-110° F (4-43° C)
Humidity: 0-100%

SHELF LIFE: Twenty-four months minimum when stored at 75° F (24° C).

COLORS: Available in Carboline Color Chart colors. Some colors may require two coats for adequate hiding. Colors containing lead or chrome pigments are not USDA acceptable. Consult your local Carboline representative or Carboline Customer Service for availability.

GLOSS: High gloss (Epoxies lose gloss and eventually chalk in sunlight exposure).

Prices may be obtained from your local Carboline Sales Representative or Carboline Customer Service Department.

APPROXIMATE SHIPPING WEIGHT:

	2's	10's
CARBOLINE 890	29 lbs.(13 kg)	145 lbs.(66 kg)
CARBOLINE Thinner #2	9 lbs. in 1's (4 kg)	45 lbs. in 5's (20 kg)
CARBOLINE Thinner #33	9 lbs. in 1's (4 kg)	45 lbs. in 5's (20 kg)

FLASH POINT: (Pensky-Martens Closed Cup)

CARBOLINE 890 Part A	84° F (29° C)
CARBOLINE 890 Part B	71° F (22° C)
CARBOLINE Thinner #2	24° F (-5° C)
CARBOLINE Thinner #33	91° F (33° C)

July 87 Replaces May 86

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining correct surface preparation, mix instructions and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to ob the maximum service from the materials.

0986

SURFACE PREPARATION: Remove oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 or Surface Cleaner #3 (refer to Surface Cleaner #3 instructions) in accordance with SSPC-SP 1.

Steel: Normally applied over clean, dry recommended primers. May be applied directly to metal. For immersion service, abrasive blast to a White Metal Finish in accordance with SSPC-SP 5 (or NACE #1) to obtain a 1 1/2 - 3 mil (40-75 micron) blast profile. For non-immersion, abrasive blast to a Commercial Finish in accordance with SSPC-SP 6 (or NACE #3) to obtain a 1 1/2 - 3 mil (40-75 micron) blast profile.

Concrete: Apply over clean, dry recommended surfacer or primer. Can be applied directly to damp(not visibly wet) or dry concrete where an uneven surface can be tolerated. Remove laitance by abrasive blasting or other means.

Do not coat concrete treated with hardening solutions unless test patches indicate satisfactory adhesion. Do not apply coating unless concrete has cured at least 28 days at 70° F (21° C) and 50% RH or equivalent time.

MIXING: Mix separately, then combine and mix in the following proportions:

	2 Gal. Kit	10 Gal. Kit
CARBOLINE 890 Part A	1 gallon	5 gallons
CARBOLINE 890 Part B	1 gallon	5 gallons

THINNING: For spray applications, may be thinned up to 6 % (8 fl. oz./gal.) by volume with CARBOLINE Thinner #2.

For brush and roller application may be thinned up to 12 % (16 fl. oz./gal.) by volume with CARBOLINE Thinner #33.

Refer to Specification Data for VOC information.

Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE: Three hours at 75° F (24° C) and less at higher temperatures. Pot life ends when material loses film build.

APPLICATION CONDITIONS:

	Material	Surfaces	Ambient	Humidity
Normal	60-85° F (16-29° C)	60-85° F (16-29° C)	60-90° F (16-32°C)	0-90%
Minimum	50° F (10° C)	50° F (10° C)	50° F (10° C)	0%
Maximum	120° F (49° C)	135° F (57° C)	120° F (49° C)	95%

Do not apply when the surface temperature is less than F (or 2° C) above the dew point.

Special thinning and application techniques may be quired above or below normal conditions.

SPRAY: This is a high solids coating and may require slig adjustments in spray techniques. Wet film thickness are easily and quickly achieved. The following spr equipment has been found suitable and is available fro manufacturers such as Binks, DeVilbiss and Graco.

Conventional: Pressure pot equipped with dual regulato 3/8" I.D. minimum material hose, .070" I.D. fluid tip a appropriate air cap.

Airless:
Pump Ratio: 30:1 (min.)*
GPM Output: 3.0 (min.)
Material Hose: 3/8"I.D.(min.)
Tip Size: .017-.021"
Output psi: 2100-2300
Filter Size: 60 mesh

*Teflon packings are recommended and are availat from the pump manufacturer.

BRUSH OR ROLLER: Use medium bristle brush, or goo quality short nap roller, avoid excessive rebrushing ar rerolling. Two coats may be required to obtain desir appearance, hiding and recommended DFT. For be results, tie-in within 10 minutes at 75° F (24° C).

DRYING TIMES: These times are at 5 mils (125 micror dry film thickness. Higher film thicknesses will lengthe cure times.

Dry to Touch 2 1/2 hours at 75° F (24° C)
Dry to Handle 6 1/2 hours at 75° F (24° C)

Temperature	Dry to Topcoat**	Final Cu
50° F (10° C)	24 hours	3 days
60° F (16° C)	16 hours	2 days
75° F (24° C)	8 hours	1 day
90° F (32° C)	4 hours	16 hou

**When recoating with CARBOLINE 890, recoat tim will be drastically reduced. Contact Carboline Technic Service for specific recommendation.

Recommended minimum cure before immersion servi is 5 days at 75° F (24° C).

CLEANUP: Use CARBOLINE Thinner #2.

CAUTION: READ AND FOLLOW ALL CAUTION STATEMEN ON THIS PRODUCT DATA SHEET AND ON THE MATERI SAFETY DATA SHEET FOR THIS PRODUCT.

CAUTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEA FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMEN AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHER EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AN NONSPARKING SHOES

product data sheet

[redacted]

8860

GENERIC TYPE: Two component, cross-linked epoxy.

GENERAL PROPERTIES: CARBOLINE 893 is a high solids, high build epoxy primer with excellent corrosion resistance. Can be applied by spray, brush or roller to yield a cured film which is tough and abrasion resistant. Performs extremely well under a wide variety of topcoats and application conditions. Available in five standard colors. Features include:

- Excellent corrosion protection.
- Good flexibility and lower stress upon curing than most epoxy coatings.
- Excellent tolerance of damp (not wet) substrates.
- Can be spray applied at up to 6 mils dry film thickness in one coat.
- Meets the most stringent VOC (Volatile Organic Content) regulations.

RECOMMENDED USES: Recommended as a general purpose epoxy primer over commercially blasted steel or intermediate coat over inorganic zinc primers. It is recommended with an appropriate topcoat for protection of structural steel, concrete, equipment and tank exteriors exposed to corrosive conditions. Consult Carboline Technical Service Department for other specific uses.

NOT RECOMMENDED FOR: Immersion service, splash and spillage of very strong solvents or concentrated acids.

TYPICAL CHEMICAL RESISTANCE:

Exposure	Splash and Spillage	Fumes
Acids	Good	Very Good
Alkalies	Good	Excellent
Solvents	Very Good	Excellent
Salt Solutions	Excellent	Excellent
Water	Excellent	Excellent

TEMPERATURE RESISTANCE:
Continuous: 200° F (93° C)
Non-Continuous: 250° F (121° C)

SUBSTRATES: Apply over suitably prepared metal, concrete, or other surfaces as recommended.

TOPCOAT REQUIRED: CARBOLINE 890, CARBOLINE D834, CARBOLINE 134, CARBOLINE 133 HB and others as recommended

COMPATIBLE COATINGS: CARBOLINE 893 may be used as an intermediate coat over inorganic zincs. A mist coat is required to minimize bubbling over inorganic zincs. As a primer for catalyzed epoxies, catalyzed urethanes and others as recommended

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
CARBOLINE 893	77% ± 2%

VOLATILE ORGANIC CONTENT:
As Supplied: 1.62 lbs. gal(195 gm liter)
Thinned: The following are nominal values utilizing.

CARBOLINE Thinner #2 (spray application)

% Thinned	FLuid Ounces/Gal.	Pounds Gallon	Grams/ Liter
9%	12	2.08	250
12%	16	2.18	261

CARBOLINE Thinner #33 (brush & roller application)

9%	12	2.08	250
12%	16	2.22	266
25%	32	2.75	329

RECOMMENDED DRY FILM THICKNESS PER COAT:
3 mils(75 microns) for use in mild environments or as an intermediate coat over CARBO ZINC 11.

4-6 mils (100-150 microns) for use in more severe environments.

Dry film thicknesses in excess of 10 mils (250 microns) per coat are not recommended. Excessive film thickness over inorganic zinc may increase damage during shipping or erection.

THEORETICAL COVERAGE PER MIXED GALLON:
1235 mil sq. ft. (30.8 sq. m.l at 25 microns)
412 sq. ft. at 3 mils (10.3 sq. m l at 75 microns)
247 sq. ft. at 5 mils (6.2 sq. m.l at 125 microns)

Mixing and application losses will vary and must be taken into consideration when estimating job requirements.

STORAGE CONDITIONS: Store Indoors
Temperature: 40-110° F (4-43° C)
Humidity: 0-90%

SHELF LIFE: Twenty-four months minimum when stored at 75° F (24° C).

COLORS: Red(0500), Gray(0700), Green(0300), Yellow(0600) and White(0800) are standard.

GLOSS: Eggshell

Prices may be obtained from your Carboline Sales Representative or Carboline Customer Service Department.

APPROXIMATE SHIPPING WEIGHT:

	2's	10's
CARBOLINE 893	29 lbs.(13 kg)	143 lbs.(65 kg)
CARBOLINE Thinner #2	9 lbs. (4 kg) in 1's	45 lbs.(20 kg) in 5's
CARBOLINE Thinner #33	9 lbs. (4 kg) in 1's	45 lbs.(20 kg) in 5's

FLASH POINT: (Pensky-Martens Closed Cup)

CARBOLINE 893 Part A	57° F (24° C)
CARBOLINE 893 Part B	57° F (14° C)
CARBOLINE Thinner #2	24° F (–5° C)
CARBOLINE Thinner #33	91° F (33° C)

July 87 Replaces May 86

:se instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining correct surface preparation, mixing tructions and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to obtain maximum service from the materials.

JRFACE PREPARATION: Remove oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner # 2 or Surface Cleaner # 3 (refer to Surface Cleaner #3 instructions) in accordance with SSPC-SP 1.

eel: Apply over clean, dry steel, abrasive blasted to a Commercial Finish in accordance with SSPC-SP 6 (or NACE # 3) to obtain a 1-2 mil (25-50 micron) blast profile.

ncrete: Apply over clean, dry recommended surfacer. Can be applied directly to dry concrete where an uneven surface can be tolerated. Remove laitance by abrasive blasting or other means.

Do not coat concrete treated with hardening solutions unless test patches indicate satisfactory adhesion. Concrete must cure at least 28 days at 70° F (21° C) and 50% R.H. or equivalent time.

XING: Mix separately, then combine and mix in the following proportions:

	2 Gal. Kit	10 Gal. Kit
CARBOLINE 893 Part A	1 gallon	5 gallons
CARBOLINE 893 Part B	1 gallon	5 gallons

DO NOT MIX PARTIAL KITS.

INNING: For spray applications, may be thinned up to 12% by volume (16 fl. oz./gallon) with CARBOLINE Thinner #2

For brush and roller application, may be thinned up to 15% (32 fl. oz./gal.) by volume with CARBOLINE Thinner # 33.

Refer to Specification Data For VOC information.

Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

T LIFE: Four hours at 75° F (24° C) and less at higher temperatures. Pot life ends when coating loses body and begins to sag. Thinning rates above 12% will shorten the working time to two hours due to reduced film build.

PLICATION CONDITIONS:

	Material	Surfaces	Ambient	Humidity
ormal	60-85° F (16-29° C)	60-85° F (16-29° C)	60-85° F (16-29° C)	0-90%
linimum	50° F (10° C)	50° F (10° C)	50° F (10° C)	0%
laximum	90° F (32° C)	135° F (57° C)	110° F (43° C)	95%

Do not apply when surface temperature is less than 5° F (or 2° C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: This is a high solids coating and may require slight adjustments in spray techniques. Wet film thicknesses are easily and quickly achieved. The following spray equipment has been found suitable and is available from manufacturers such as Binks, DeVilbiss and Graco.

Conventional: Pressure pot equipped with dual regulators, 3/8" I.D. minimum material hose, .070" I.D. fluid tip and appropriate air cap.

Airless:
Pump Ratio: 30:1 (min.)*
GPM Output: 3.0 (min.)
Material Hose: 3/8"I.D.(min.)
Tip Size: .017-.021"
Output psi: 2100-2300
Filter Size: 60 mesh

*Teflon packings are recommended and are available from the pump manufacturer.

BRUSH OR ROLLER: Use medium bristle brush, or good quality short nap roller, avoid excessive rebrushing and rerolling. Two coats may be required to obtain desired appearance, hiding and recommended DFT. For best results tie-in within 10 minutes at 75° F (24° C).

DRYING TIMES: These times are at 4 mils(100 microns) dry film thickness. Film thicknesses higher than 4 mils(100 microns) will lengthen cure times.

Dry to Touch: 3 hours at 75° F (24° C)
Dry to Handle: 6 hours at 75° F (24° C)

Temperature	Dry to Topcoat
50° F (10° C)	24 hours
60° F (16° C)	16 hours
75° F (24° C)	8 hours
90° F (32° C)	4 hours

If allowed to weather, chalking should be removed by water washing and then allowed to dry thoroughly prior to topcoating.

CLEANUP: Use CARBOLINE Thinner # 2.

CAUTION: READ AND FOLLOW ALL CAUTION STATEMENTS ON THIS PRODUCT DATA SHEET AND ON THE MATERIAL SAFETY DATA SHEET FOR THIS PRODUCT.

UTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEAR ESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMENT D INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHERE PLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AND NSPARKING SHOES.

350 Hanley Industrial Ct • St. Louis, MO 63144-1595
an RPM company • 314-644-1000

product data sheet

0991

GENERIC TYPE: Two component, cross-linked epoxy.

GENERAL PROPERTIES: CARBOLINE 893 RCP is a high solids, high build epoxy primer with excellent corrosion resistance and in-shop characteristics. Can be spray applied to yield a cured film which is tough and abrasion resistant. Performs extremely well under a wide variety of topcoats and application conditions. Available in four standard colors. Features include:

- Excellent corrosion protection.
- Rapid Cure — For quick handling and topcoating.
- Prethinned — Ready to Spray.
- Good flexibility and lower stress upon curing than most epoxy coatings.
- Excellent tolerance of damp (not wet) substrates.
- Can be spray applied at up to 5 mils dry film thickness in one coat.
- Meets the most stringent VOC (Volatile Organic Content) regulations.

RECOMMENDED USES: Recommended as a general purpose epoxy primer over commercially blasted steel or intermediate coat over inorganic zinc primers where quick recoat and cure times are desired. It is recommended with an appropriate topcoat for protection of structural steel, equipment and tank exteriors exposed to corrosive conditions. Consult Carboline Technical Service Department for other specific uses.

NOT RECOMMENDED FOR: Immersion service, splash and spillage of very strong solvents or concentrated acids.

TYPICAL CHEMICAL RESISTANCE:

Exposure	Splash and Spillage	Fumes
Acids	Good	Very Good
Alkalies	Good	Excellent
Solvents	Very Good	Excellent
Salt Solutions	Excellent	Excellent
Water	Excellent	Excellent

TEMPERATURE RESISTANCE:
Continuous: 200°F (93°C)
Non-continuous: 250°F (121°C)

SUBSTRATES: Apply over suitably prepared metal or other surfaces as recommended.

TOPCOAT REQUIRED: CARBOLINE 890, CARBOLINE D834, CARBOLINE 134, CARBOLINE 133 HB and others as recommended.

COMPATIBLE COATINGS: CARBOLINE 893 RCP may be used as an intermediate coat over inorganic zincs. A mist coat is required to minimize bubbling over inorganic zincs. As a primer for catalyzed epoxies, catalyzed urethanes and others as recommended.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
CARBOLINE 893 RCP	62% ± 2%

VOLATILE ORGANIC CONTENT:*

As Supplied: 2.67 lbs. gal. (320 gm/liter)

RECOMMENDED DRY FILM THICKNESS PER COAT:
3 mils (75 microns) for use in mild environments or as an intermediate coat over CARBO ZINC 11.

5 mils (125 microns) for use in more severe environments.

Dry film thicknesses in excess of 10 mils (250 microns) per coat are not recommended. Excessive film thickness over inorganic zinc may increase damage during shipping or erection.

THEORETICAL COVERAGE PER MIXED GALLON:
994 mil sq. ft. (24.8 sq. m/l at 25 microns)
331 sq. ft. at 3 mils (8.3 sq. m/l at 75 microns)
199 sq. ft. at 5 mils (5.0 sq. m/l at 125 microns)

Mixing and application losses will vary and must be taken into consideration when estimating job requirements.

STORAGE CONDITIONS: Store Indoors
Temperature: 40-110°F (4-43°C)
Humidity: 0-90%

SHELF LIFE: Twelve months minimum when stored at 75°F (24°C).

COLORS: Red (0500), Gray (0700), Yellow (0600) and White (0800) are standard.

GLOSS: Satin

Prices may be obtained from your local Carboline Sales Representative or Carboline Customer Service Department.

APPROXIMATE SHIPPING WEIGHT:

	2's	10's
CARBOLINE 893 RCP	25 lbs. (11 kg)	122 lbs. (55 kg)

FLASH POINT: (Pensky-Martens Closed Cup)

CARBOLINE 893 RCP Part A	36°F (2°C)
CARBOLINE 893 RCP Part B	41°F (5°C)

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining correct surface preparation, mi instructions and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to ob the maximum service from the materials.

0991

SURFACE PREPARATION: Remove oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 or Surface Cleaner #3 (refer to Surface Cleaner #3 instructions) in accordance with SSPC-SP 1.

Steel: Apply over clean, dry steel, abrasive blasted to a Commercial Finish in accordance with SSPC-SP 6(or NACE #3) to obtain a 1-2 mil (25-50 micron) blast profile.

MIXING: Mix separately, then combine and mix in the following proportions:

	2 Gal. Kit	10 Gal. Kit
CARBOLINE 893 RCP Part A	1 gallon	5 gallons
CARBOLINE 893 RCP Part B	1 gallon	5 gallons

THINNING: As supplied, this product is prethinned and ready to spray. Additional thinning is not normally required.

Refer to Specification Data For VOC information

POT LIFE: Four hours at 75°F (24°C) and less at higher temperatures. Pot life ends when coating loses body and begins to sag.

APPLICATION CONDITIONS:

	Material	Surfaces	Ambient	Humidity
Normal	60-85°F (16-29°C)	60-85°F (16-29°C)	60-85°F (16-29°C)	0-90%
Minimum	50°F (10°C)	50°F (10°C)	50°F (10°C)	0%
Maximum	90°F (32°C)	135°F (57°C)	110°F (43°C)	95%

Do not apply when surface temperature is less than 5°F (or 2°C) above the dew point.

Special application techniques may be required above or below normal conditions.

SPRAY: This is a high solids coating and may require slight adjustments in spray techniques. Wet film thicknesses are easily and quickly achieved. The following spray equipment has been found suitable and is available from manufacturers such as Binks, DeVilbiss and Graco.

Conventional: Pressure pot equipped with dual regulators, ; I.D. minimum material hose, .070" I.D. fluid tip and appropri air cap.

Airless:
Pump Ratio: 30:1 (min.)*
GPM Output: 3.0 (min.)
Material Hose: 3/8"I.D. (min.)
Tip Size: .017-.021"
Output psi: 2100-2300
Filter Size: 60 mesh

*Teflon packings are recommended and are available from pump manufacturer.

BRUSH OR ROLLER: Not recommended for use with a rol Brush for touch-up only. Use medium bristle brush and av rebrushing.

DRYING TIMES: These times are at 4 mils(100 microns) dry f thickness Film thicknesses higher than 4 mils(100 microns) lengthen cure times

Dry to Touch: 2 hours at 75°F (24°C)
Dry to Handle. 3 hours at 75°F (24°C)
Dry to Walk on*: 4 hours at 75°F (24°C)

*With appropriate footwear for cleanliness.

Temperature	Dry to Topcoat
50°F (10°C)	12 hours
60°F (16°C)	8 hours
75°F (24°C)	4 hours
90°F (32°C)	2 hours

If allowed to weather, chalking should be removed by wa washing and then allowed to dry thoroughly prior to topcoati

CLEANUP: Use CARBOLINE Thinner #2.

CAUTION: READ AND FOLLOW ALL CAUTION STATEMEN ON THIS PRODUCT DATA SHEET AND ON THE MATERI SAFETY DATA SHEET FOR THIS PRODUCT.

CAUTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEA FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMEN AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHEF EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AN NONSPARKING SHOES.

GENERIC TYPE: Single-package, modified silicone.

GENERAL PROPERTIES: Single-package coating that withstands continuous temperatures of 1000°F (538°C) and surges up to 1200°F (649°C) and exhibits outstanding resistance to thermal shock from 1000°F (538°C) to 32°F (0°C). Only one coat is required, but may be applied over CARBO ZINC® 11 base coat for superior performance. A CARBO ZINC 11 base coat prevents rusting of steel and rust streaks during shutdown or when operating temperature falls below 200°F (93°C).

RECOMMENDED USES: Recommended for coating stacks, breeching, furnaces, hot piping, mufflers, exhausts and other elevated temperature steel surfaces in any industry, including marine. Generally used where temperatures exceed 500°F (260°C).

NOT RECOMMENDED FOR: Immersion service or exposure to splash and spillage of acids or alkalies.

CHEMICAL RESISTANCE GUIDE:

Exposure	Splash and Spillage	Fumes
Acids	Fair	Fair
Alkalies	Poor	Fair
Solvents	Good	Good
Salt	Good	Very Good
Water	Good	Very Good

TEMPERATURE RESISTANCE: (non-immersion)

Continuous:	1000°F (538°C)
Noncontinuous:	1200°F (649°C)

FLEXIBILITY: Good WEATHERING: Excellent

ABRASION RESISTANCE: Good

SUBSTRATES: Carbon steel or stainless steel.

TOPCOAT REQUIRED: None required

PRIMER REQUIRED: None required. A prime coat of CARBO ZINC 11, however, will greatly increase service life over steel.

COMPATIBILITY WITH OTHER COATINGS: May be applied over inorganic zincs such as CARBO ZINC 11. Excessive film thicknesses of CARBOLINE 4631 over inorganic zincs may result in blistering and delamination when the temperature is increased.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
CARBOLINE 4631	30% ± 2%

RECOMMENDED DRY FILM THICKNESS PER COAT: 1½ mils (40 microns) Two coats are recommended over steel and one coat over inorganic zincs.

THEORETICAL COVERAGE PER MIXED GALLON*:
481 mil sq. ft. (12 sq. m/l at 25 microns)
321 sq. ft. at 1½ mils (7.5 sq. m/l at 40 microns)

*NOTE: Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: Six months minimum.

COLORS: Aluminum only.

Prices may be obtained from Carboline sales representative or main office.

APPROXIMATE SHIPPING WEIGHT:

	1's	5's
CARBOLINE 4631	10 lbs. (4.5 kg)	48 lbs. (21.8 kg)
CARBOLINE Thinner #10	9 lbs. (4.1 kg)	45 lbs. (20.5 kg)

FLASH POINT: Pensky-Martens Closed Cup)

CARBOLINE 4631	68°F (20°C)
CARBOLINE Thinner #10	77°F (25°C)

Aug. 84 Replaces March 81

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining co surface preparation, mixing instructions, and application procedure. It is assumed that the proper product recommendations have made. These instructions should be followed closely to obtain the maximum service from the materials.

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SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 or toluol in accordance with SSPC-SP 1-82.

Steel: For best results, a Commercial Blast Finish in accordance with SSPC-SP 6-82 or NACE #3 is recommended. Performs well over a mechanically cleaned surface. All surfaces must be free of dust and grease before application. CARBO ZINC 11 must be properly cured before application of CARBOLINE 4631.

MIXING: Power mix to a uniform consistency before thinning. Thin up to 12% by volume with CARBOLINE Thinner #10.

NOTE: Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

APPLICATION TEMPERATURES:

	Material	Surfaces
Normal	70°F (21°C)	75°F (24°C)
Minimum	40°F (4°C)	50°F (10°C)
Maximum	90°F (32°C)	110°F (43°C)

	Ambient	Humidity
Normal	75°F (24°C)	10-80%
Minimum	40°F (4°C)	0%
Maximum	110°F (43°C)	95%

Do not apply when the surface temperature is less than 5°F (2°C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use sufficient air volume for correct operation of equipment.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edges first, making an extra pass later.

NOTE: The following equipment has been found suitable; however, equivalent equipment may be substituted.

Conventional: Use a 3/8" minimum I.D. material hose. Hold gun approximately 12-14 inches from the surface and at a right angle to the surface.

Mfr. & Gun	Fluid Tip	Air Cap
Binks #18 or #62	63B	63PB
DeVilbiss P-MBC or JGA	FX	704
	Approx. .046" I.D.	

Airless: Use a 3/8" minimum I.D. material hose. Hold g approximately 18-20 inches from the surface and at a ri angle to the surface.

Mfr. & Gun	Pump*
DeVilbiss JGB-510	QFA-519 32:1
Graco 205-641	Bulldog 30:1
Binks Model 700	B5-18 or B8-36

*Teflon packings are recommended and are available fr manufacturer. Use a .013-.015" tip with 2200 psi.

BRUSH OR ROLLER: Spray is recommended. For sm areas or touch-up, use natural bristle brush, applying w full strokes. Avoid rebrushing. Use short nap mohair ro with phenolic core.

DRYING TIMES:

Between Coats:	40°F (4°C)	16 hours
	50°F (10°C)	8 hours
	60°F (16°C)	4 hours
	75°F (24°C)	2 hours
	90°F (32°C)	1 hour

Final Cure: To obtain optimum properties, coating can cured in service at temperatures of 350°F (177°C) 450°F (232°C). Allow initial increase in temperature proceed slowly up to 350°F (177°C) over a 6 hour ti period.

REPAIR/TOUCH-UP PROCEDURES: Recommended small areas only.

Surface defects, runs or sags:
Hand or power sand or grind area until level with surrou ing surface.

Mechanical damage to substrate:
Power sand or grind affected area to provide a surface co parable to a Commercial Blast Finish (SSPC-SP 6-82). F ther edge to surrounding coating. Wipe damaged area a surrounding coating with CARBOLINE Thinner #2 xylol. Touch up by brush applying CARBOLINE 4631.

CLEANUP: Use CARBOLINE Thinner #2 or xylol.

STORAGE CONDITIONS:
Temperature: 40°F (4°C) - 110°F (43°C)
Humidity: 0-100%

CAUTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WE FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPME AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHE EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE A NONSPARKING SHOES.

GENERIC TYPE: Single package, modified silicone.

GENERAL PROPERTIES: A protective coating for medium to high temperature service with good resistance to mild chemical fume environments. After curing, the coating is very resistant to thermal shock conditions from ambient temperatures to 750°F (399°C).

RECOMMENDED USES: For the protection of equipment such as stacks, incinerators, furnace exteriors and heat exchangers operating from ambient temperatures to 750°F (399°C). The use of an inorganic zinc primer, such as CARBO ZINC® 11, prevents rusting during shutdown and/or when the equipment is exposed to moisture and salts at temperatures less than 200°F (93°C).

NOT RECOMMENDED FOR: Immersion service

CHEMICAL RESISTANCE GUIDE:

Exposure	Splash and and Spillage	Fumes
Acids	Good	Excellent
Alkalies	Fair	Excellent
Solvents	Poor	Good
Salt	Good	Excellent
Water	Excellent	Excellent

TEMPERATURE RESISTANCE: (non-immersion)
Continuous: 750°F (399°C)
Non-continuous: 1000°F (538°C)

FLEXIBILITY: Good WEATHERING: Excellent

ABRASION RESISTANCE: Fair

SUBSTRATES: Apply to properly prepared steel or over inorganic zincs.

TOPCOAT REQUIRED: None

COMPATIBILITY WITH OTHER COATINGS: May be applied over inorganic zinc primer such as CARBO ZINC 11. Consult Carboline Technical Service for specific recommendations.

NOTE: A mist coat may be required over inorganic zincs to minimize bubbling.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
CARBOLINE 4674	42% ± 2%

RECOMMENDED DRY FILM THICKNESS PER COAT: 1.5 mils (40 microns)

Note: Excessive thickness may cause blistering.

THEORETICAL COVERAGE PER MIXED GALLON:*
674 mil sq. ft. (16.8 sq. m/1 at 25 microns)
450 sq. ft. at 1.5 mils (10.5 sq. m/1 at 40 microns)

*NOTE: Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: 24 months minimum when stored at 75°F (24°C).

COLORS: Aluminum C901 and Black C900 only.

GLOSS: Low

Prices may be obtained from Carboline Sales Representative or Main Office.

APPROXIMATE SHIPPING WEIGHT:

	1 GAL.	5 GAL.
CARBOLINE 4674	11 lbs. (5.0 kg)	51 lbs. (23.2 kg)
CARBOLINE THINNER #10	9 lbs. (4.1 kg)	45 lbs. (20.4 kg)

FLASH POINT: (Pensky-Martens Closed Cup)
CARBOLINE 4674 68°F (20°C)
CARBOLINE THINNER #10 83°F (28°C)

March 86 Replaces April 82

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining corr surface preparation, mixing instructions, and application procedure. It is assumed that the proper product recommendations have been ma These instructions should be followed closely to obtain the maximum service from the materials.

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SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 in accordance with SSPC-SP 1.

Steel: Preferred: Abrasive blast to a Near White Metal Finish in accordance with SSPC-SP-10-63 (Swedish Standard Sa 2½) to a degree of cleanliness in accordance with NACE #3 to obtain a 1-2 mil (25-50 micron) blast profile.

Acceptable: Abrasive blast to a Commercial Finish in accordance with SSPC-SP6 63 (Swedish Standard Sa 2) to a degree of cleanliness in accordance with NACE #3 to obtain a 1-2 mil (25-50 micron) blast profile.

MIXING: Mix to smooth consistency with a mechanical agitator such as "jiffy" mixer. Thin up to 12% by volume with CARBOLINE Thinner #10, if necessary.

NOTE: Use of thinners other than those supplied or approved by Carboline may adversely affect product performance or void product warranty whether express or implied.

APPLICATION TEMPERATURES:

	Material	Surfaces
Normal	60-90°F (16-32°C)	65-90°F (18-32°C)
Minimum	40°F (4°C)	40°F (4°C)
Maximum	100°F (38°C)	180°F (82°C)

	Ambient	Humidity
Normal	60-90°F (16-32°C)	10-85%
Minimum	0°F (−18°C)	0%
Maximum	130°F (54°C)	95%

Do not apply when the surface temperature is less than 5°F (2°C) above the dew point. Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use sufficient air volume for correct operation.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edges first, making an extra pass later.

NOTE: The following equipment has been found suitable, however, equivalent equipment may be substituted.

Conventional: Use a 3/8" minimum I.D. material hose. Hold gun approximately 12-14 inches from the surface a at a right angle to the surface.

Mfr. & Gun	Fluid Tip	Air Ca
Binks #18 or #62	63B	63PB
DeVilbiss PMBC or JGA	FX	704
	approx. .043" I.D.	

Airless: Use a 3/8" minimum I.D. material hose. Hold g approximately 18-20 inches from the surface and at a ri angle to the surface.

Mfr. & Gun	Pump*
DeVilbiss JGB-507	QFA-159
Graco 205-591	President 30:1 or Bulldog 30:1
Binks Model 500	Mercury 5C

*Teflon packings are recommended and available fr pump manufacturer.

Use a .013-.015" tip with 2200 psi.

BRUSH: Recommended for small areas or touch-up onl Avoid rebrushing or reworking of material. Take care avoid excessive film thickness. Use a natural bristle bru applying with full strokes.

ROLLER: Not recommended.

DRYING TIMES:

Between coats	TIME	TEMPERATURE (SURFACE)
	8 hours	50°F (10°C)
	6 hours	60°F (16°C)
	4 hours	75°F (24°C)
	2 hours	90°F (32°C)

Final cure: To obtain optimum properties, coating can cured in service at temperatures of 350°F (177°C) 450°F (232°C). Allow initial increase in temperature proceed slowly up to 350°F (177°C) over a six hour tin period.

CLEAN UP: Use CARBOLINE Thinner #2.

STORAGE CONDITIONS: (Store Indoors)
Temperature: 40-110°F (4-43°C) Humidity: 0-100

CAUTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEA FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMEN AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHER EXPLOSION HAZARDS EXIST. WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AN NONSPARKING SHOES

product data sheet

GENERIC TYPE: Modified phenolic. Part A and Part B mixed prior to application.

GENERAL PROPERTIES: A medium build, modified phenolic tank lining having excellent all-around chemical, thermal shock and abrasion resistance. Cures to a hard, tough film. A three coat system at 5 mils (125 microns) per coat can be used on steel or concrete. PHENOLINE 373 is acceptable under 21 CFR 121.2514 (FDA) for direct food contact surfaces, in appropriate colors, as recommended.

RECOMMENDED USES: PHENOLINE 373 is an effective and economical lining system for steel and concrete tanks containing dilute acids, caustic salt or solvents. Also for tanks storing or processing wet or dry food products. A system consisting of PHENOLINE 373 Primer and PHENOLINE 373 Finish is used for lining tanks of ocean-going chemical carriers because of resistance to a wide range of chemicals and food products. PHENOLINE 373 Finish can be used to protect floors from splash and spillage of corrosives.

NOT RECOMMENDED FOR: Exposure to strong mineral and organic acids.

CHEMICAL RESISTANCE GUIDE:

Exposure	Immersion	Splash and Spillage
Acids	Very Good	Excellent
Alkalies	Excellent	Excellent
Solvents	Excellent	Excellent
Salt	Excellent	Excellent
Water	Very Good	Excellent

TEMPERATURE RESISTANCE: (non-immersion)
Continuous: 180°F (82°C)
Non-continuous: 200°F (93°C)

Immersion temperature resistance depends on exposure. Consult Carboline Tank Lining Bulletin #1, Chart #42 or the Technical Service Department for specific recommendations. Metal tanks operating above 140°F (60°C) must normally be insulated.

FLEXIBILITY: Fair **WEATHERING:** Good (Chalks)

ABRASION RESISTANCE: Excellent

SUBSTRATES: Apply over properly prepared steel, concrete, stainless steel, aluminum or others as recommended.

TOPCOAT REQUIRED: None for PHENOLINE 373 Finish. PHENOLINE 373 Primer may be topcoated with epoxies, modified phenolic or other generic types as recommended.

COMPATIBILITY WITH OTHER COATINGS: PHENOLINE 373 Finish is normally used over PHENOLINE 373 Primer or other modified phenolics and catalyzed epoxy primers as recommended.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
PHENOLINE 373 Primer	76% ± 2%
PHENOLINE 373 Finish	73% ± 2%

RECOMMENDED DRY FILM THICKNESS PER COAT:
(Typical System)

1 coat PHENOLINE 373 Primer	5 mils (125 microns)
1 coat PHENOLINE 373 Finish Green	5 mils (125 microns)
1 coat PHENOLINE 373 Finish Gray	5 mils (125 microns)

THEORETICAL COVERAGE PER MIXED GALLON*:
PHENOLINE 373 Primer
1219 mil sq. ft. (30.4 sq.m/1 at 25 microns)
244 sq. ft. at 5 mils (6.1 sq.m/1 at 125 microns)

PHENOLINE 373 Finish
1171 mil sq. ft. (29.2 sq.m/1 at 25 microns)
234 sq. ft. at 5 mils (5.8 sq.m/1 at 125 microns)

***NOTE:** Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: 24 months minimum when stored at 75°F (24°C).

COLORS: PHENOLINE 373 Primer — White 0810 only
PHENOLINE 373 Finish — Green 4339, Gray C703

GLOSS: Medium

Prices may be obtained from Carboline Sales Representative or Main Office. Terms — Net 30 days.

APPROXIMATE SHIPPING WEIGHT:

	1's	5's
PHENOLINE 373 Primer	14 lbs. (6.4 kg)	70 lbs. (31.8 kg)
PHENOLINE 373 Finish	15 lbs. (6.8 kg)	75 lbs. (34.1 kg)
PHENOLINE Thinner	9 lbs. (4.1 kg)	45 lbs. (20.4 kg)

FLASH POINT: (Pensky-Martens Closed Cup)

PHENOLINE 373 Primer Part A	72°F (22°C)
PHENOLINE 373 Primer Part B	40°F (4°C)
PHENOLINE 373 Finish Part A	66°F (19°C)
PHENOLINE 373 Finish Part B	71°F (22°C)
PHENOLINE Thinner	77°F (25°C)

May 85 Replaces March 81

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining corr surface preparation, mixing instructions and application procedure. It is assumed that the proper product recommendations have be made. These instructions should be followed closely to obtain the maximum service from the materials.

620

SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE® Thinner #2 in accordance with SSPC-SP 1-82.

Steel: For immersion service, dry abrasive blast to a White Metal finish in accordance with SSPC-SP 5-82 to a degree of cleanliness in accordance with NACE #1 to obtain a 2 to 3 mil (50-75 micron) blast profile. For non-immersion service, dry abrasive blast to a Commercial finish in accordance with NACE #3 to obtain a 2 to 3 mil (50-75 micron) blast profile.

Concrete: Remove fins and other protrusions by stoning, sanding or grinding. Concrete must be cured at least 28 days at 70°F (21 C) and 50% R.H. or equivalent time. Remove form oils, incompatible curing agents and hardeners by abrasive blasting. For immersion service, abrasive blast to open all voids and obtain a surface similar to medium grit sandpaper (horizontal surfaces may be acid etched). Voids in the concrete may require surfacing with CARBOLINE 195 Surfacer prior to application of PHENOLINE 373 Primer. Blow or vacuum off sand and dust. For non-immersion service, horizontal surfaces must be acid etched or abrasive blasted to remove laitance. For other surfaces blow off with compressed air to remove dust or other contaminants.

PHENOLINE 373 Finish can be applied over a recommended surfacer

MIXING: Mix separately, then combine and mix in the following proportions:

	1 Gal.	5 Gals.
PHENOLINE 373 Primer or Finish Part A	.8 Gal.	4 Gals.
PHENOLINE 373 Primer or Finish Part B	.2 Gal.	1 Gal.

Thin up to 18% by volume with PHENOLINE Thinner.

NOTE: Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE:
PHENOLINE 373 Primer: Two hours at 75°F'(24°C) and less at higher temperatures.

PHENOLINE 373 Finish: 1-1½ hours at 75°F (24°C) and less at higher temperatures. Pot life ends when coating loses body and begins to sag.

APPLICATION TEMPERATURES:

	Material	Surfaces
Normal	65-85°F (18-29°C)	65-85°F (18-29°C)
Minimum	55°F (13°C)	50°F (10°C)
Maximum	90°F (32°C)	90°F (32°C)

	Ambient
Normal	65-85°F (18-29°C)
Minimum	50°F (10°C)
Maximum	110°F (43°C)

HUMIDITY CONTROL:

	Humidity
Normal	30-40%
Minimum	0%
Maximum	45%

Do not apply when the surface temperature is less than 5°F (2°C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use sufficient air volume for correct operation of equipme

Use a 50% overlap with each pass of the gun. On irregular surfaces, the edges first, making an extra pass later.

NOTE: The following equipment has been found suitable; how equivalent equipment may be substituted

Conventional: Use a 3/8" minimum I.D. material hose. Hold gun ap imately 12-14" from the surface and at a right angle to the surface.

Mfr. & Gun	Fluid Tip	Air
Binks #18 or #62	66	63
DeVilbiss MBC or JGA	E	7
	Approx. .070" I.D.	

Airless: Use a 3/8" minimum I.D. material hose. Hold gun approxim 18-20" from the surface and at a right angle to the surface.

Mfr. & Gun	Pump
DeVilbiss JGB 519	JGA 519
Graco 205-591	Bulldog 30:1
Binks Model 700	B8-36 37:1

*Teflon packings are recommended and are available from pump m facturer. Use a .017-.021" tip with 2200 psi

BRUSH: Brush application is recommended for touch-up only. Use r ral bristle brush applying with full strokes. Avoid rebrushing.

RECOAT AND CURE TIME:

Temperature	Primer Minimum	Finish Minimum	Primer & Finish Maximum*	Final Cu
50°F (10°C)	6 days	72 hours	30 days	60-120
60°F (16°C)	3 days	36 hours	14 days	15-60
75°F (24°C)	36 hours	18 hours	7 days	7-30
90°F (32°C)	12 hours	12 hours	4 days	5-15

*If maximum recoat time is exceeded and recoat is necessary, sp surface preparation may be required.

**Force curing is recommended for all tank linings. Final cure temp tures below 60°F (16°C) are not recommended for tank linings. Final requirement varies depending on first cargo. Consult your Carb Representative for advice.

NOTE: Excessive film thickness or poor ventilating conditions rec longer dry times and in extreme cases will cause premature failure.

EXCESSIVE HUMIDITY OR CONDENSATION ON THE SURF DURING CURING MAY RESULT IN A SURFACE HAZE OR BLU ANY HAZE OR BLUSH MUST BE REMOVED BY WATER WASH BEFORE RECOATING.

VENTILATION & SAFETY: When used as a tank lining or in encl areas, thorough air circulation must be used during and after applic until the coating is cured. The ventilation system should be capabl preventing the solvent vapor concentration from reaching the lowe plosion limit for the solvents used. In addition to proper ventilation, f air respirators or fresh air hoods must be used by all application per nel. Where flammable solvents exist, explosion-proof lighting equipr must be used. Hypersensitive persons should wear protective clot gloves and/or protective cream on face, hands and all exposed area

CLEAN UP: Use CARBOLINE Thinner #2.

STORAGE CONDITIONS: Store indoors.
Temperature: 40-110°F (4-43°C)

product data sheet

0625

GENERIC TYPE: Two component modified phenolic.

GENERAL PROPERTIES: A medium build, modified phenolic tank lining system having excellent broad range chemical resistance.

- Excellent caustic and solvent resistance.
- FDA acceptable for direct food contact surfaces (21 CFR 175.300).
- Ambient cure provides a tough, hard film.
- Thermal shock and abrasion resistance.
- Meets stringent VOC (Volatile Organic Content) regulations.

RECOMMENDED USES: PHENOLINE 376 is a high performance, cost effective lining system for steel and concrete tanks containing dilute acids, alkalies or a variety of fuels, oils and solvents. This FDA acceptable lining may also be used for tanks containing wet or dry food products. Because of its broad range chemical resistance, PHENOLINE 376 is an excellent choice for lining stationary tanks and rolling stock.

NOT RECOMMENDED FOR: Exposure to strong mineral or organic acids.

TYPICAL CHEMICAL RESISTANCE:

Exposure	Immersion	Splash & Spillage
Acids	Very Good	Excellent
Alkalies	Excellent	Excellent
Solvents	Excellent	Excellent
Salt	Excellent	Excellent
Water	Excellent	Excellent

TEMPERATURE RESISTANCE: (Non-immersion)
Continuous: 180° F (82° C)
Non-continuous: 200° F (93° C)

Immersion temperature resistance depends on exposure. Consult Carboline's Chart 18 or the Technical Service Department for specific cargo and temperature recommendations. Metal tanks operating above 140° F (60° C) must normally be insulated.

SUBSTRATES: Apply over properly prepared steel, stainless steel, aluminum, concrete or others as recommended.

COMPATIBLE COATINGS: PHENOLINE 376 is normally a two coat system consisting of Primer and Finish. PHENOLINE 376 Finish may be used over recommended concrete surfacers. For specific recommendations consult Carboline Technical Service Department.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
PHENOLINE 376 Primer or Intermediate	75% ± 2%
PHENOLINE 376 Finish	70% ± 2%

VOLATILE ORGANIC CONTENT (VOC):
As Supplied:

PHENOLINE 376 Primer, or Intermediate	1.74 lbs./gal. (209 grams/liter)
PHENOLINE 376 Finish	2.11 lbs./gal. (252 grams/liter)

Thinned: The following are nominal values utilizing CARBOLINE Thinner #94.

	% Thinned	Fluid Ozs./Gal.	Lbs./ Gal.	Grams/ Liter
PHENOLINE 376 Primer or Intermediate	10%	13	2.20	268
PHENOLINE 376 Finish	5%	6	2.36	282

RECOMMENDED DRY FILM THICKNESS PER COAT:
(Typical System)

1 coat PHENOLINE 376 Primer	4-6 mils (100-150 microns)
1 coat PHENOLINE 376 Finish	4-6 mils (100-150 microns)

When a three coat system is specified, use PHENOLINE 376 Primer, Intermediate and Finish at 3-5 mils (75-125 microns) per coat. DO NOT use multiple coats of PHENOLINE 376 Finish.

IMPORTANT: PHENOLINE 376 should be applied within the recommended dry film thickness ranges. Excessive film thickness may cause premature failure.

THEORETICAL COVERAGE PER MIXED GALLON:
PHENOLINE 376 Primer or Intermediate:
1203 mil sq. ft. (30.0 sq. m/l at 25 microns)
241 sq. ft. at 5 mils (6.0 sq. m/l at 125 microns)

PHENOLINE 376 Finish:
1123 mil sq. ft. (28.0 sq. m/l at 25 microns)
225 sq. ft. at 5 mils (5.6 sq. m/l at 125 microns)

Mixing and application losses will vary and must be taken into consideration when estimating job requirements.

STORAGE CONDITIONS: (Store Indoors)
Temperature: 40-110° F (4-43° C) Humidity: 0-95%

SHELF LIFE: Twenty-four months when stored at 75° F (24° C).

COLORS: PHENOLINE 376 Primer: White (0810)
PHENOLINE 376 Intermediate: Blue (0100)
PHENOLINE 376 Finish: Gray (0746)

GLOSS: Primer or Intermediate — Flat
Finish — Satin

Prices may be obtained from your local Carboline Sales Representative or Carboline Customer Service.

APPROXIMATE SHIPPING WEIGHT:

	1 Gal. Kit	5 Gal. Kit
PHENOLINE 376 Primer or Intermediate	16 lbs. (8 kg)	80 lbs. (36 kg)
PHENOLINE 376 Finish	15 lbs. (7 kg)	75 lbs. (34 kg)
CARBOLINE® Thinner #94	8 lbs. (4 kg)	38 lbs. (17 kg)

FLASH POINT: (Pensky-Martens Closed Cup)

PHENOLINE 376 Primer or Intermediate Part A	88° F (31° C)
PHENOLINE 376 Primer-Intermediate Part B	66° F (19° C)
PHENOLINE 376 Finish Part A	78° F (26° C)
PHENOLINE 376 Finish Part B	60° F (16° C)
CARBOLINE Thinner #94	31° F (–1° C)

March 88 replaces February 88

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining correct surface preparation, mix instructions and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to obt the maximum service from the materials.

0625

SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 or Surface Cleaner #3 (refer to Surface Cleaner #3 instructions) in accordance with SSPC-SP 1.

Steel: IMMERSION SERVICE: Abrasive blast to a White Metal Finish in accordance with SSPC-SP 5 (or NACE #1), to obtain a 2-3 mil (50-75 micron) blast profile. Weld slag must be removed and welds ground to a rounded contour. Striping of properly prepared welds with PHENOLINE 376 Primer or Intermediate by brush or spray is recommended prior to full coat application.
NON-IMMERSION SERVICE: Abrasive blast to Commercial Finish in accordance with SSPC-SP 6 (or NACE #3), to obtain a 2-3 mil (50-75 micron) blast profile.

Concrete: Remove fins and other protrusions by stoning, sanding or grinding. Concrete must be cured at least 28 days at 70° F (21 C) and 50% R.H., or equivalent time. Remove form oils, incompatible curing agents and hardeners by abrasive blasting.
IMMERSION SERVICE: Abrasive blast to open all surface voids and obtain a surface similar to medium grit sandpaper. Voids in the concrete may require surfacing with appropriate surfacer prior to application with the system.
NON-IMMERSION SERVICE: Horizontal surfaces must be abrasive blasted to remove laitance. For other surfaces blow off with compressed air to remove dust or other contaminants.

MIXING: Power mix separately, then combine and mix in the following proportions:

	1 Gal.	5 Gal.
PHENOLINE 376 Primer, Intermediate or Finish — Part A	.8 gallons	4 gallons
PHENOLINE 376 Primer/ Intermediate or Finish — Part B	.2 gallons	1 gallons

DO NOT MIX PARTIAL KITS.

THINNING: PHENOLINE 376 Primer and Intermediate may be thinned up to 10% by volume and PHENOLINE 376 Finish may be thinned up to 5% by volume with CARBOLINE Thinner #94. Do not overthin, this will shorten working time due to reduced film build.

Refer to Specification Data for VOC information.

Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE:
PHENOLINE 376 Primer or Intermediate:
1-1/2 hours at 75° F (24° C) or less at higher temperatures.
PHENOLINE 376 Finish:
1 to 1-1/2 hours at 75° F (24° C) or less at higher temperatures.

Pot life ends when coating loses body and begins to sag.

APPLICATION TEMPERATURES:

	Material	Surfaces	Ambient	Humidity
Normal	65-85° F (18-29° C)	65-85° F (18-29° C)	65-85° F (18-29° C)	30-45%
Minimum	55° F (13° C)	50° F (10° C)	50° F (10° C)	0%
Maximum	90° F (32° C)	90° F (32° C)	110° F (43° C)	60%

Do not apply when the surface temperature is less than 5° F or 2° C above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: The following spray equipment has been found suita and is available from manufacturers such as Binks, DeVilbiss a Graco.

Conventional: Pressure pot equipped with dual regulators, 3 I.D. minimum material hose, .070" I.D. fluid tip and appropri air cap.

Airless:
Pump Ratio: 30:1 (minimum)*
GPM Output: 3.0 (minimum)
Material Hose: 3/8" I.D. (minimum)
Tip Size: .017-.021"
Output psi: 2000-2400
Filter Size: 60 mesh

*Teflon packings are recommended and are available from t pump manufacturer.

BRUSH: Brush application is recommended for touch-up a striping of welds only. Use natural bristle brush, applying w full strokes. Avoid rebrushing.

RECOAT AND CURE TIME: These times are based on reco mended dry film thicknesses.

Temperature	Between Coats Minimum	Between Coats Maximum**	System Final Cure***
50 F (10 C)	4 days	30 days	N/R
60° F (16° C)	2 days	14 days	15-60 days
75 F (24° C)	24 hours	7 days	7-30 days
90° F (32° C)	12 hours	4 days	5-15 days

** If maximum recoat time is exceeded and recoat is necessa special surface preparation may be required.

*** Final cure temperatures below 60° F (16° C) are not reco mended for tank linings. Final cure requirement varies deper ing on exposure. Force curing is recommended for all ta linings. Consult Carboline Bulletin #709 or Carboline Techni Service for advice.

Excessive film thickness or poor ventilating conditions requ longer dry times and in extreme cases will cause prematu failure.

EXCESSIVE HUMIDITY OR CONDENSATION ON THE SURFA DURING CURING MAY RESULT IN A SURFACE HAZE BLUSH; ANY HAZE OR BLUSH MUST BE REMOVED BY WAT WASHING BEFORE RECOATING.

CLEANUP: Use CARBOLINE Thinner #2 or CARBOLINE Thinr #94.

CAUTION: READ AND FOLLOW ALL CAUTION STATEMENTS ON TH PRODUCT DATA SHEET AND ON THE MATERIAL SAFETY DATA SHE FOR THIS PRODUCT.

CAUTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEA FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMEN AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHEF EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AN NONSPARKING SHOES.

product data sheet

GENERIC TYPE: Flake glass polyester. Catalyst added prior to use.

GENERAL PROPERTIES: CARBOGLAS 1678 has three outstanding features: excellent resistance to abrasion and impact, outstanding resistance to moisture penetration and excellent performance under impressed current. A 25 mil (625 micron) film contains a labyrinth of over 100 layers of platelets held in a tough polyester matrix. Tight adhesion is maintained even after long aging and extreme physical abuse. Will resist cavitation erosion longer than epoxies or epoxy-coal tars. Undercutting in salt water immersion is negligible — even after 12 months.

No primer is required. The recommended 25 mil (625 micron) film thickness can be applied in one coat and the coating can complete its cure under water. CARBOGLAS 1678 can be applied by conventional or airless spray. Rolling or brushing after application is not required.

RECOMMENDED USES: Areas where resistance to physical abuse and/or protection from water or brine is required. Outstanding protection of underground transformers, exteriors of buried piping, tanks and other underground equipment. Excellent in heavy duty marine applications such as barge bottoms, ship hulls, traveling dam gates, splash zone of pilings, piers and legs of offshore rigs.

NOT RECOMMENDED FOR: Tank lining service in alkalies, acids or most solvents.

CHEMICAL RESISTANCE GUIDE:

Exposure	Immersion	Splash & Spillage	Fumes
Acids	Not Recommended	Excellent	Excellent
Alkalies	Not Recommended	Good	Excellent
Solvents	Not Recommended	Good	Excellent
Salts	Excellent	Excellent	Excellent
Water	Excellent	Excellent	Excellent

TEMPERATURE RESISTANCE: (non-immersion)
Continuous: 180°F (82°C)
Non-continuous: 250°F (121°C)

Immersion temperature resistance depends on exposure. Consult Carboline Tank Lining Bulletin #1 or Technical Service Department for specific recommendations. Metal tanks operating above 140°F (60°C) must normally be insulated.

FLEXIBILITY: Fair **ABRASION RESISTANCE:** Excellent

SUBSTRATES: Apply over suitably prepared steel.

PRIMER: Apply directly to properly prepared steel.

TOPCOAT REQUIRED: CARBOGLAS 1678 is recommended as a single coat system. However, where extra insurance against skips and thin spots is desired, the recommended film thickness can be built up in two coats, if special precautions are taken (refer to Application Instructions).

COMPATIBILITY WITH OTHER COATINGS: Normally not used with other coatings.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
CARBOGLAS 1678	98% ± 2%

RECOMMENDED DRY FILM THICKNESS PER COAT:
One coat at 20-30 mils (500-750 microns)

THEORETICAL COVERAGE PER MIXED GALLON:*
1572 mil sq. ft. (39.2 sq. m/l at 25 microns)
63 sq. ft. at 25 mils (1.6 sq. m/l at 625 microns)

TYPICAL COVERAGE PER MIXED GALLON:*
35 sq. ft. at 25 mils (1.0 sq. m/l at 625 microns)

*NOTE: Since a volatile monomer is used, losses during field applications are affected by the following.

1. Styrene monomer evaporation during application and cure may result in up to a 20% lower coverage rate compared to theoretical usage.
2. Application of the product when material and surface temperatures are above normal will result in greater monomer loss, causing lower coverage rates.
3. With the recommended blast profile, up to 10% additional material will be required to fill in the blast profile.
4. Due to these factors and the glass flake in CARBOGLAS 1678, measurement of the wet film thickness is difficult. Film thickness readings should be made after the product has dried to touch, using a properly calibrated magnetic gauge.
5. Material losses during mixing and spray losses should be taken into consideration when estimating job requirements. These losses are in addition to factors affecting coverage referenced above.
6. Practical coverage rates of 30-40 square feet per gallon have been experienced with this material, depending upon roughness and configuration of the surface, and application conditions.

SHELF LIFE: Six months when stored at 40-90°F(4-32°C).

COLORS: Gray

GLOSS: Flat

Prices may be obtained from Carboline sales representative or main office.

APPROXIMATE SHIPPING WEIGHT:

CARBOGLAS 1678 Part A (5 gallons)	60 lbs. (27 kg)
CARBOGLAS 1600 Catalyst (14 fluid ounces)	2 lbs. (1 kg)
1 gal. CARBOLINE® Additive #47	9 lbs. (4 kg)

FLASH POINT: (Pensky-Martens Closed Cup)

CARBOGLAS 1678 Part A	90°F (32°C)
CARBOGLAS 1600 Catalyst	137°F (58°C)
CARBOLINE Additive #47	90°F (32°C)

SELF-ACCELERATING DECOMPOSITION TEMPERATURE:
CARBOGLAS 1600 Catalyst 145°F (63°C)

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining corr surface preparation, mixing instructions, and application procedure. It is assumed that the proper product recommendations have been ma These instructions should be followed closely to obtain the maximum service from the materials.

310

SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 or toluol in accordance with SSPC-SP 1-82.

Non-immersion Service: Dry abrasive blast to a Near White Metal finish in accordance with SSPC-SP 10-82 (Swedish Standards, Sa 2½) to a degree of cleanliness in accordance with NACE #2 to obtain a 3-4 mils (75-100 micron) profile.

Immersion Service: Dry abrasive blast to a White Metal finish in accordance with SSPC-SP 5-82 (Swedish Standards Sa3) to a degree of cleanliness in accordance with NACE #1 to obtain a 3-4 mil (75-100 micron) profile.

MIXING: Mix the Part A using power mixer, then add the CARBOGLAS 1600 Catalyst and mix in the following proportions:

	5 Gal Kit
CARBOGLAS 1678 Part A	5 Gallons
CARBOGLAS 1600 Catalyst	14 fl. oz.

CARBOLINE Additive #47 should be used up to 8 ounces per gallon to reduce viscosity, and improve application characteristics and coverage rate.

POT LIFE: Ninety minutes at 75°F (24°C) and less at higher temperatures. Pot life ends when coating gels.

APPLICATION TEMPERATURES:

	Material	Surfaces
Normal	65-80°F (18-27°C)	65-80°F (18-27°C)
Minimum	55°F (13°C)	55°F (13°C)
Maximum	110°F (43°C)	110°F (43°C)

	Ambient	Humidity
Normal	65-80°F (18-27°C)	30-80%
Minimum	55°F (13°C)	0%
Maximum	110°F (43°C)	90%

Do not apply when the surface temperature is less than 5°F (2°C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use sufficient air volume for correct operation of equipment.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edges first, making an extra pass later.

NOTE: The following equipment has been found suitable; however, equivalent equipment may be substituted.

Conventional: Use a ½" minimum I.D. nylon lined material hose. Hold gun approximately 12-14 inches from the surface and at a right angle to the surface.

Mfr. & Gun	Fluid Tip	Air Cap
DeVilbiss P-MBC or JGA	D	64
Binks #62	67-68 PG	67-68
	Approx. .110" I.D.	

A bottom outlet pressure pot is recommended.

Airless: Use a ½" minimum I.D. nylon lined material ho Hold gun approximately 18-20 inches from the surface a at a right angle to the surface.

Mfr. & Gun	Pump*
Graco 208-663	Graco 30:1 Bulldog Airless Mastic Pump
Binks Model 720 or 700	

Use .035-.041" tip with 2200 psi.

*Teflon packings are recommended and are available fro pump manufacturer. Reversible tips are recommended.

DRY TIMES:

Between Coats: Apply second coat while first coat is tac (2-4 hours) or wipe first coat with xylol if film has cur hard.

Final Cure:

Surface Temperature	Before Water Immersion
55°F (13°C)	24 hours
75°F (24°C)	8 hours
90°F (32°C)	4 hours

VENTILATION & SAFETY

Ventilate enclosed areas at least four hours after final app cation prior to applying external heat. When used as a tar lining or in enclosed areas, thorough air circulation must used during and after application until the coating is cure The ventilation system should be capable of preventing t solvent vapor concentration from reaching the lower e plosion limit for the solvents used. In addition to prop ventilation, fresh air respirators or fresh air hoods must used by all application personnel. Where flammable s vents exist, explosion-proof lighting equipment must used. Hypersensitive persons should wear clean protecti clothing, gloves and/or protective cream on face, hands a all exposed areas.

CLEAN UP: Use CARBOLINE Thinner #2 or toluol.

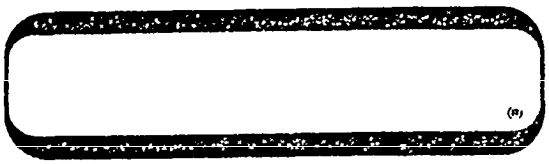
STORAGE CONDITIONS:
Temperature: 40-90°F (4-32°C) Humidity: 0-100

Storage at higher temperatures will greatly reduce shelf lif

CARBOGLAS 1678 Part A
CAUTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WOR MEN MUST WEAR FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTI CREAM. ALL ELECTRIC EQUIPMENT AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH TH NATIONAL ELECTRICAL CODE. IN AREAS WHERE EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO U NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AND NONSPARKING SHOES.

CARBOGLAS 1600 Catalyst
CAUTION: WARNING! OXIDIZING MATERIAL. KEEP AWAY FROM FIRE. HARMFUL IF SWALLOWED. STRONG IRRITANT. STOR IN ORIGINAL CLOSED CONTAINER IN A COOL PLACE. PROTECT FROM DIRECT SUNLIGHT, HEAT, SPARKS AND OPEN FLAME DO NOT ADD TO HOT MATERIALS. PREVENT CONTAMINATION WITH FOREIGN MATERIALS, ESPECIALLY READILY OXIDI ABLE MATERIALS AND ACCELERATORS. INGESTION OR CONTACT WITH SKIN OR EYES SHOULD BE AVOIDED. IN CASE C CONTACT, FLUSH WITH COPIOUS AMOUNTS OF WATER. IF IN DOUBT, CONSULT A PHYSICIAN.
KEEP OUT OF REACH OF CHILDREN

WARNING: EXPLOSION HAZARD. FAILURE TO OBSERVE THE ABOVE PRECAUTIONS MAY RESULT IN EXPLOSIVE DECOMPOS TION, WHICH COULD CAUSE SERIOUS BODILY INJURY OR DEATH.



0804

GENERIC TYPE: Single-package, polyurethane alkyd copolymer.

GENERAL PROPERTIES: CARBOLINE 139 is an easy to apply high gloss maintenance system topcoat with excellent brush, roller and spray characteristics, fast dry times and a quick final cure. This product may be applied over CARBOLINE E21 Primer to provide a complete single package urethane maintenance system or may be applied over CARBOMASTIC® 15 to provide a high performance maintenance system. In either case only one application thinner is needed.

RECOMMENDED USES: Recommended as a maintenance finish coat for properly primed pumps, motors, machinery, equipment, piping, handrails and other similar uses. CARBOLINE 139 is an excellent recommendation when quick handling properties are required.

NOT RECOMMENDED FOR: Immersion service or exposure to strong acid or caustic fumes or spillage.

CHEMICAL RESISTANCE GUIDE:

Exposure	Splash and Spillage	Fumes
Acids	N/R	Very Good*
Alkalies	N/R	Good
Solvents	Poor	Very Good
Salt	Fair	Excellent
Water	Good	Very Good

*Certain colors may discolor.

TEMPERATURE RESISTANCE (non-immersion):
Continuous: 180°F (82°C)
Non-continuous: 220°F (104°C)

FLEXIBILITY: Excellent **WEATHERING:** Excellent

ABRASION RESISTANCE: Good

SUBSTRATES: Properly primed steel or concrete surfaces.

TOPCOAT REQUIRED: None required.

PRIMER REQUIRED: Most alkyd or universal primers acceptable. Consult Carboline Technical Service for specific recommendations.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume*
CARBOLINE 139 White	49% ± 2%

*NOTE: Theoretical solids content by volume may vary with color.

RECOMMENDED DRY FILM THICKNESS PER COAT:
2 mils (50 microns)

NOTE: Multiple coats may be required in certain colors for adequate hiding.

THEORETICAL COVERAGE PER MIXED GALLON:**
786 mil sq. ft. (19.6 sq.m/l at 25 microns)
393 sq. ft. at 2 mils (9.8 sq.m/l at 50 microns)

****NOTE:** Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: Twenty-four months minimum when stored at 75°F (24°C). Higher temperatures will reduce shelf life.

COLORS: Gray C703, Gray C705, White S800 and White 1864 are standard. Consult your local Carboline representative or Carboline Customer Service for availability of other colors.

GLOSS: High.

Prices may be obtained from Carboline Sales Representative or Main Office.

APPROXIMATE SHIPPING WEIGHT:

	1's	5's
CARBOLINE 139	11 lbs. (5 kg)	55 lbs. (25 kg)
CARBOMASTIC Thinner	9 lbs. (4 kg)	45 lbs. (21 kg)
CARBOLINE Thinner #45	9 lbs. (4 kg)	45 lbs. (21 kg)

FLASH POINT: (Pensky-Martens Closed Cup)

CARBOLINE 139	82°F (27°C)
CARBOMASTIC Thinner	83°F (28°C)
CARBOLINE Thinner #45	105°F (41°C)

Sept. 86 Replaces Dec. 84

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining cor surface preparation, mixing instructions and application procedure. It is assumed that the proper product recommendations have b made. These instructions should be followed closely to obtain the maximum service from the materials.

0804

SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2, or brush/spray applied CARBOLINE Surface Cleaner #3 in accordance with SSPC-SP 1-82.

Steel or Concrete: Apply over properly primed or previously coated surfaces.

MIXING: Power mix until uniform in consistency. Thin up to 15% by volume with CARBOMASTIC Thinner for spray application. For brush or roller, use CARBOLINE Thinner #45 up to 10% by volume.

NOTE: Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

APPLICATION TEMPERATURES:

	Material	Surfaces	Ambient	Humidity
Normal	60-90°F (16-32°C)	70-90°F (21-32°C)	50-85°F (10-29°C)	50%
Minimum	40°F (4°C)	40°F (4°C)	40°F (4°C)	5%
Maximum	110°F (43°C)	165°F (74°C)	100°F (38°C)	95%

Do not apply when the surface temperature is less than 5°F (2°C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use sufficient air volume for correct operation of equipment.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edges first, making an extra pass later.

NOTE: The following equipment has been found suitable; however, equivalent equipment may be substituted.

Conventional: Use a 3/8" minimum I.D. material hose. Hold gun approximately 12-14 inches from the surface and at a right angle to the surface.

Mfr. & Gun	Fluid Tip	Air Cap
DeVilbiss MBC or JGA	FX	704
Binks #18 or #62	63B	63PB
	Approx. .043" I.D.	

Airless: Use a 3/8" minimum I.D. material hose and an line 60-100 mesh filter. Hold gun approximately 18-inches from the surface and at a right angle to the surfac

Mfr. & Gun	Pump*
DeVilbiss JGB-507	QFA-514 or 519
Graco 205-591	President 30:1 or Bulldog 30
Binks Model 700	B5-18 or B8-36 37:1

*Teflon packings are recommended and available fr pump manufacturer.

Use a .013-.017" tip with 2200 psi.

BRUSH OR ROLLER: Thinning not normally requir when necessary, thin up to 10% by volume w CARBOLINE Thinner #45. Use natural bristle brush, ap with full strokes. Avoid rebrushing. Use short nap moh roller with phenolic core. Avoid rerolling. Multiple co may be required when applied by brush or roller to provi uniform hiding.

DRYING TIMES: At 2 mils (50 microns) DFT and 50% R.

Dry-to-touch:	50°F (10°C)	4 hours
	75°F (24°C)	1-2 hours
	90°F (32°C)	45 minut
Dry hard:	50°F (10°C)	24 hours
	75°F (24°C)	18-20 hours
	90°F (32°C)	12-14 hours

NOTE: Applications at thicknesses higher than reco mended will substantially lengthen dry time.

CLEANUP: Use CARBOLINE Thinner #2.

STORAGE CONDITIONS: Store Indoors

Temperature: 40-110°F (4-43°C) Humidity: 0-10

CAUTION: CONTAINS COMBUSTIBLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEA FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMEN AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE IN AREAS WHEF EXPLOSION HAZARDS EXIST. WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AN NONSPARKING SHOES.

product data sheet

0859

GENERIC TYPE: Two component, acrylic aliphatic polyurethane.

GENERAL PROPERTIES: CARBOLINE D834 is an attractive, high gloss, high solids urethane topcoat which is easily applied by airless or conventional spray. It is designed to yield a hard, very cleanable surface. It exhibits excellent flow and leveling properties to minimize dryspray and lapmarks. Features include:

- Outstanding Gloss and Color Retention
- Excellent Weatherability
- Excellent Flexibility
- Excellent Abrasion Resistance
- Ready to Spray — Prethinned
- Suitable for plural component spray

CARBOLINE D834 meets most VOC (Volatile Organic Content) requirements.

RECOMMENDED USES: Recommended as a finish coat for exteriors of railcars and tanks, equipment, piping, structural steel and concrete surfaces where chemical resistance, high gloss and color retention are required. Consult Carboline Technical Service Department for specific uses other than those recommended.

NOT RECOMMENDED FOR: Immersion Service.

TYPICAL CHEMICAL RESISTANCE:

Exposure	Splash & Spillage	Fumes
Acids	Very Good	Excellent
Alkalies	Very Good	Excellent
Solvents	Very Good	Excellent
Salt	Excellent	Excellent
Water	Excellent	Excellent

TEMPERATURE RESISTANCE:
Continuous: 200° F (93° C)
Non-continuous: 250° F (121° C)

SUBSTRATES: Apply over properly prepared metals, sealed concrete or others as recommended.

COMPATIBLE COATINGS: May be used over epoxies, urethanes and others as recommended. Typically applied as a topcoat for CARBOLINE 893, CARBOLINE 893 RCP, CARBOMASTIC™ 15 Low Odor, CARBOMASTIC 90, CARBOLINE 890 or CARBOLINE 801 for systems which are low in volatile emissions.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume*
CARBOLINE D834	65% ± 2%

VOLATILE ORGANIC CONTENT*
As Supplied: 2.5 lbs./gal. (300 gm/liter)
Thinned: The following are nominal values utilizing CARBOLINE Thinner #97

% Thinned	Fluid Ounces/Gal.	Pounds/ Gallon	Grams/ Liter
10%	13	3.00	360

*Varies with color

RECOMMENDED DRY FILM THICKNESS PER COAT:
2-3 mils (50-75 microns) over smooth surfaces

Certain colors may require multiple coats for adequate hiding. Additional thickness may be required over rough surfaces for appearance. Dry film thickness in excess of 6 mils (150 microns) per coat are not recommended.

THEORETICAL COVERAGE PER MIXED GALLON:
1043 mil sq. ft. (26.0 sq. m/l at 25 microns)
522 sq. ft. at 2 mils (13.0 sq. m/l at 50 microns)

Mixing and application losses must be taken into consideration when estimating job requirements.

STORAGE CONDITIONS: Store Indoors
Temperature: 40-110° F (4-43° C)
Humidity: 0-80%

SHELF LIFE: When stored at 75° F (24° C).
CARBOLINE D834 Part A: Twelve months.
CARBOLINE Urethane Converter 811: Twenty-four months.

COLORS: Available in Carboline Color Chart colors. Consult your Carboline Sales Representative or Customer Service Representative for color availability.

GLOSS: High

Prices may be obtained from your local Carboline Sales Representative or Customer Service Representatives.

APPROXIMATE SHIPPING WEIGHT:

	1 Gal. Kit	5 Gal. Kit
CARBOLINE D834	13 lbs. (6 kg)	63 lbs. (29 kg)
CARBOLINE Thinner #97	8 lbs. (4 kg)	39 lbs. (18 kg) in 5's

FLASH POINT: (Pensky-Martens Closed Cup)

CARBOLINE D834 Part A	102° F (39° C)
CARBOLINE Urethane Converter 811	106° F (41° C)
CARBOLINE Thinner #97	150° F (66° C)

April 88 Replaces December 87

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining correct surface preparation, mixir instructions and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to obta the maximum service from the materials.

0856

SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 or Carboline Surface Cleaner #3 (refer to Surface Cleaner #3 instructions) in accordance with SSPC-SP 1.

Substrates: Apply over clean, dry and properly prepared steel and concrete substrates.

MIXING: Mix separately, then combine and mix in the following proportions:

	1 Gal. Kit	5 Gal. Kit
CARBOLINE D834 Part A	0.8 gallons (in a 1 gal. can)	4 gallons (in a 5 gal. can)
CARBOLINE Urethane Converter 811	0.2 gallons (in a 1 qt. can)	1 gallon

THIS PRODUCT IS MOISTURE SENSITIVE. AVOID MOISTURE CONTAMINATION. DO NOT MIX PARTIAL KITS.

THINNING: Although prethinned and ready to spray, this product may be thinned up to an additional 10% by volume with CARBOLINE Thinner #97.

Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

Refer to Specification Data for VOC information.

POT LIFE: Four hours at 75° F (24° C) and less at higher temperatures. Pot life ends when material becomes too viscous to use. This product is moisture sensitive. Avoid moisture contamination.

APPLICATION CONDITIONS:

	Material	Surfaces	Ambient	Humidity
Normal	60-85° F (16-29° C)	60-85° F (16-29° C)	60-85° F (16-29° C)	40-60%
Minimum	50° F (10° C)	40° F (4° C)	40° F (4° C)	10%
Maximum	100° F (38° C)	120° F (49° C)	95° F (35° C)	80%

Do not apply when surface temperature is less than 5° F or 2° C above the dew point.

Special thinning and application techniques may be r quired above or below normal conditions.

SPRAY: This is a high solids coating and may require sligl adjustments in spray techniques. Wet film thickness are easily and quickly achieved. The following spra equipment has been found suitable and is available fro manufacturers such as Binks, DeVilbiss and Graco.

Conventional: Pressure pot equipped with dual regulator air powered agitator, 3/8" I.D. minimum material hos .070" I.D. fluid tip and appropriate air cap.

Airless:
Pump Ratio: 30:1 (min.)*
GPM Output: 3.0 (min.)
Material Hose: 3/8" I.D. (min.)
Tip Size: .015-.017"
Output psi: 2100-2300
Filter Size: 60 mesh

*Teflon packings are recommended and are availab from the pump manufacturer.

For plural component spray information, contact Carb line Technical Service Department.

BRUSH OR ROLLER: Use a medium bristle brush, or goc quality short nap roller, avoid excessive rebrushing an rerolling. Two coats may be required to obtain desire appearance and adequate hiding. For best results, tie-i within 10 minutes at 75° F (24° C).

DRYING TIMES: These times are at recommended dry fil thickness (2-3 mils). Film thicknesses higher than recon mended will lengthen cure time.

Temperature	Dry to Handle	Final Cur
35° F (2° C)	18 hours	14 days
50° F (10° C)	8 hours	7 days
75° F (24° C)	4 hours	3 days
90° F (32° C)	1 hour	24 hours

CLEANUP: Use CARBOLINE Thinner # 2.

CAUTION: READ AND FOLLOW ALL CAUTION STATEMENTS ON TH PRODUCT DATA SHEET AND ON THE MATERIAL SAFETY DA SHEET FOR THIS PRODUCT.

CAUTION: CONTAINS COMBUSTIBLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEA FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMEN AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHER EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AN NONSPARKING SHOES.

350 Hanley Industrial Ct. • St. Louis, MO 63144-1599

0854

GENERIC TYPE: Two component, acrylic aliphatic polyurethane.

GENERAL PROPERTIES: CARBOLINE D834 HS is an attractive, high gloss, high solids urethane topcoat which is easily applied by airless or conventional spray to yield a hard, very cleanable surface. It exhibits excellent flow and leveling properties to minimize dryspray and lapmarks. Features include:

- Outstanding Gloss and Color Retention
- Excellent Weatherability
- Excellent Flexibility
- Excellent Abrasion Resistance

CARBOLINE D834 High Solids meets most VOC (Volatile Organic Content) requirements.

RECOMMENDED USES: Recommended as a finish coat for exteriors of railcars and tanks, equipment, piping, structural steel and concrete surfaces where chemical resistance, high gloss and color retention are required. Consult Carboline Technical Service Department for specific uses other than those recommended.

NOT RECOMMENDED FOR: Immersion Service.

TYPICAL CHEMICAL RESISTANCE:

Exposure	Splash & Spillage	Fumes
Acids	Very Good	Excellent
Alkalies	Very Good	Excellent
Solvents	Very Good	Excellent
Salt	Excellent	Excellent
Water	Excellent	Excellent

TEMPERATURE RESISTANCE:
Continuous: 200° F (93° C)
Non-continuous: 250° F (121° C)

SUBSTRATES: Apply over properly prepared metals, sealed concrete or others as recommended.

COMPATIBLE COATINGS: May be used over epoxies, urethanes and others as recommended. Typically applied as a topcoat for CARBOLINE 893, CARBOLINE 893 RCP CARBOMASTIC® 15 Low Odor, CARBOLINE 890 or CARBOLINE 801 for systems which are low in volatile emissions.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume*
CARBOLINE D834 HS	75% ± 2%

VOLATILE ORGANIC CONTENT (VOC)*:
As Supplied: 1.75 lbs./gal.(210 gm./liter)
Thinned: The following are nominal values utilizing CARBOLINE Thinner #97.

% Thinned	Fluid Ounces/ Gal.	Pounds/ Gal.	Grams/ Liter
6.5%	8	2.08	250
15%	19	2.50	300
25%	32	2.94	353

A ready to spray version, CARBOLINE D834 is available at 18°.. thinning level

* Varies with color

RECOMMENDED DRY FILM THICKNESS PER COAT:
2-3 mils (50-75 microns) over smooth surfaces.

Certain colors may require multiple coats for adequate hiding. Additional thickness may be required over rough surfaces for appearance. Dry film thickness in excess of 6 mils (150 microns) per coat are not recommended.

THEORETICAL COVERAGE PER MIXED GALLON:
1203 mil sq. ft.(30 sq. m/l at 25 microns)
602 sq. ft. at 2 mils(15 sq. m/l at 50 microns)

Mixing and application losses must be taken into consideration when estimating job requirements.

STORAGE CONDITIONS: Store Indoors
Temperature: 40-110° F (4-43° C)
Humidity: 0-80%

SHELF LIFE: When stored at 75° F (24° C).
CARBOLINE D834 HS Part A: Twelve months.
CARBOLINE Urethane Converter 811: Twenty-four months.

COLORS: Available in a limited number of colors. Consult your Carboline Sales Representative or Customer Service Representative for color availability.

GLOSS: High

Prices may be obtained from your local Carboline Sales Representative or Customer Service Representatives.

APPROXIMATE SHIPPING WEIGHT:

	1 Gal. Kit	4 Gal. Kit
CARBOLINE D834 HS	14 lbs. (6 kg)	53 lbs. (24 kg)
CARBOLINE Thinner #97	8 lbs. (4 kg)	39 lbs. (18 kg) in 5's

FLASH POINT: (Pensky-Martens Closed Cup)

CARBOLINE D834 HS Part A	102° F (39° C)
CARBOLINE Urethane Converter 811	106° F (41° C)
CARBOLINE Thinner #97	150° F (66° C)

April 88 replaces June 87N

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining corre surface preparation, mixing instructions and application procedure. It is assumed that the proper product recommendations have be made. These instructions should be followed closely to obtain the maximum service from the materials.

0854

SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 or CARBOLINE Surface Cleaner #3 (refer to Surface Cleaner #3 instructions) in accordance with SSPC-SP 1.

Substrates: Apply over clean, dry and properly prepared steel and concrete substrates.

MIXING: Mix separately, then combine and mix in the following proportions:

	1 Gal. Kit	4 Gal. Kit
CARBOLINE D834 HS Part A	.60 gallons (in 1 gal. can)	3 gallons (in 5 gal. can)
CARBOLINE Urethane Converter 811	.20 gallons (in 1 quart can)	1 gallon

THIS PRODUCT IS MOISTURE SENSITIVE. AVOID MOISTURE CONTAMINATION. DO NOT MIX PARTIAL KITS.

THINNING: May be thinned up to 15% by volume with CARBOLINE Thinner #97 for spray applications.

May be thinned up to 25% by volume with CARBOLINE Thinner #97 for brush or roller applications.

Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and will void product warranty whether expressed or implied.

Refer to Specification Data for VOC information.

POT LIFE: Four hours at 75° F (24° C) and less at higher temperatures. Pot life ends when material becomes too viscous to use. This product is moisture sensitive. Avoid moisture contamination.

APPLICATION CONDITIONS:

	Material	Surfaces	Ambient	Humidity
Normal	60-85° F (16-29° C)	60-85° F (16-29° C)	60-85° F (16-29° C)	40-60%
Minimum	50° F (10° C)	40° F (4° C)	40° F (4° C)	10%
Maximum	100° F (38° C)	120° F (49° C)	95° F (35° C)	80%

Do not apply when the surface temperature is less than 5° F or 2° C above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: This is a high solids coating and may require sli adjustments in spray techniques. Wet film thicknes are easily and quickly achieved. The following sp equipment has been found suitable and is available fr manufacturers such as Binks, DeVilbiss and Graco.

Conventional: Pressure pot equipped with dual regulat air powered agitator, 3/8" I.D. minimum material hc .070" I.D. fluid tip and appropriate air cap.

Airless:
Pump Ratio: 30:1 (min.)*
GPM Output: 3.0 (min.)
Material Hose: 3/8" I.D. (min.)
Tip Size: .015-.017"
Output psi: 2100-2300
Filter Size: 60 mesh

*Teflon packings are recommended and are availa from the pump manufacturer.

BRUSH OR ROLLER: Use a medium bristle brush, or gc quality short nap roller, avoid excessive rebrushing a rerolling. Two coats may be required to obtain desi appearance and adequate hiding. For best results, tie within 10 minutes at 75° F (24° C).

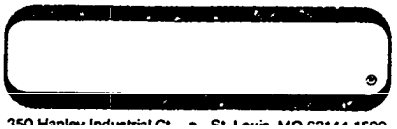
DRYING TIMES: These times are at recommended dry f thickness (2-3 mils). Film thicknesses higher than recc mended will lengthen cure time.

Temperature	Dry To Handle	Final Cu
35° F (2° C)	18 hours	14 day
50° F (10° C)	8 hours	7 day
75° F (24° C)	4 hours	3 day
90° F (32° C)	1 hour	24 hou

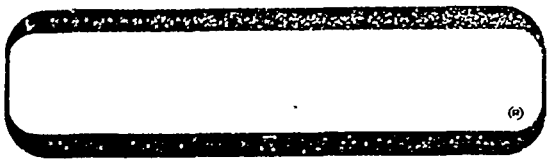
CLEANUP: Use CARBOLINE Thinner #2.

CAUTION: READ AND FOLLOW ALL CAUTION STA MENTS ON THIS PRODUCT DATA SHEET AND ON T MATERIAL SAFETY DATA SHEET FOR THIS PRODUCT.

CAUTION: CONTAINS COMBUSTIBLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEA FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPMEN AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHER EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AN NONSPARKING SHOES.



product data sheet



773

GENERIC TYPE: Polyvinyl-butyral wash primer. Part A and Part B mixed prior to application.

GENERAL PROPERTIES: A thin-film primer/pre-treatment that can be applied over non-ferrous metals to promote adhesion, thus eliminating the need for sandblasting. May be topcoated with most generic types of topcoats.

Conforms to MIL-P-15328D for a wash primer.

RECOMMENDED USES: A pre-treatment for galvanized steel, aluminum, magnesium and most non-ferrous metals.

NOT RECOMMENDED FOR: Chemical exposure without suitable topcoat.

CHEMICAL RESISTANCE GUIDE: Refer to topcoat used.

TEMPERATURE RESISTANCE: (non-immersion)

Continuous:	180°F (82°C)
Non-continuous:	200°F (93°C)

FLEXIBILITY: Very Good WEATHERING: N.A.

ABRASION RESISTANCE: Good

SUBSTRATES: Apply to properly prepared sandblasted steel, cold rolled steel, galvanized or most alloys as recommended.

TOPCOAT REQUIRED: Can normally be topcoated with epoxies, epoxy coal tar, modified phenolics, vinyls, chlorinated rubbers or acrylic. Consult Carboline Technical Service Department for specific topcoat recommendations.

COMPATIBILITY WITH OTHER COATINGS: Apply directly to the substrate. May be applied over inorganic zincs.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Volume
Carboline 1037 WP	10% ± 2%

RECOMMENDED DRY FILM THICKNESS PER COAT: 1/2 mil (12 microns)

Note: Excessive film thickness may cause reduced adhesion.

THEORETICAL COVERAGE PER MIXED GALLON*:
160 mil sq. ft. (4.0 m^2/1 @ 25 microns)
320 sq. ft. at 1/2 mil (8.3 m^2/1 @ 12 microns)

*NOTE: Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: 24 months minimum.

COLORS: Green 0300.

GLOSS: Flat

Prices may be obtained from Carboline Sales Representative or Main Office. Terms — Net 30 days.

SHIPPING WEIGHT:

	1's	5's
Carboline 1037 WP	8 lbs. (3.6 kg)	42 lbs. (19.1 kg)
Carboline Thinner #21	8 lbs. (3.6 kg)	36 lbs. (16.3 kg)

FLASH POINT: (Pensky-Martens Closed Cup)

Carboline 1037 WP Part A	53°F (12°C)
Carboline 1037 WP Part B	64°F (18°C)
Carboline Thinner #21	53°F (12°C)

March 81 Replaces June 78-N

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining corr surface preparation, mixing instructions, and application procedure. It is assumed that the proper product recommendations have been ma These instructions should be followed closely to obtain the maximum service from the materials.

773

SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in Carboline Thinner #2 or toluol.

Steel: Apply over clean, grease-free, dry substrates. Alloys that oxidize should be lightly sanded to remove loose material. For use over inorganic zincs, material should be properly cured and all loose material removed.

Non-ferrous metals and galvanizing: Apply over clean, grease-free, dry substrates.

MIXING: Pre-mix Part A thoroughly and slowly add Part B under agitation. Insufficient pre-mixing may reduce pot life and cause premature gellation.

	5 Gal. Kit
Carboline 1037 WP Part A	4 gals.
Carboline 1037 WP Part B	1 gal.

Thin up to 50% by volume with Carboline Thinner #21.

NOTE: Use only thinner recommended by Carboline Company. Many solvents are incompatible with Carboline 1037 WP.

POT LIFE: Eight hours at 75°F (24°C) and less at higher temperatures. Pot life ends when coating becomes too viscous to use.

APPLICATION TEMPERATURES:

	Material	Surfaces
Normal	60-85°F (16-29°C)	65-85°F (18-29°C)
Minimum	45°F (7°C)	40°F (4°C)
Maximum	110°F (43°C)	150°F (66°C)

	Ambient	Humidity
Normal	60-90°F (16-32°C)	40-60%
Minimum	40°F (4°C)	0%
Maximum	120°F (49°C)	85%

Do not apply when the surface temperature is less than 5°F (2°C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use adequate air volume for correct operati

Use a 50% overlap with each pass of the gun. On irregu surfaces, coat the edges first, making an extra pass lat

NOTE: The following equipment has been found suitab however, equivalent equipment may be substituted.

Conventional: Use a 3/8" minimum I.D. material ho Hold gun 8-10 inches from the surface and at a right an to the surface.

Mfr. & Gun	Fluid Tip	Air Cap
Binks #18 or #62	63B	63PB
DeVilbiss P-MBC or JGA	FX	704
	Approx. .043" I.D.	

Airless: Use a 3/8" minimum I.D. material hose. Hold g 12-14 inches from the surface and at a right angle to t surface.

Mfr. & Gun	Pump*
DeVilbiss JGB-507	QFA-514
Graco 205-591	President 30:1 or Bulldog 30:1
Binks Model 500	Mercury 5C

*Teflon packings are recommended and available fr pump manufacturer.

Use a .013-.017" tip with 2000 psi.

BRUSH OR ROLLER: For touch-up only. Thin as requir with Carboline Thinner #21. Use a natural bristle bru applying with full strokes, or use short nap mohair roll with a phenolic core.

DRYING TIMES:

Before topcoating:	4 hours at 50°F (10°C)
	2 hours at 60°F (16°C)
	1 hour at 75°F (24°C)
	½ hour at 90°F (32°C)

CLEAN UP: Use Carboline Thinner #21 or alcohol solver

STORAGE CONDITIONS:
Temperature: 40-110°F (4-43°C) Humidity: 0-10(

CAUTION: CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WE FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EQUIPME AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHE EXPLOSION HAZARDS EXIST, WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AN NONSPARKING SHOES.

0242

GENERIC TYPE: Single package, self-curing, inorganic zinc-filled coating providing a basic zinc silicate complex.

GENERAL PROPERTIES: CARBO ZINC 10 is designed for use as a single package, inorganic zinc primer that provides excellent long-term galvanic protection of ferrous substrates. Fast drying characteristics minimize damage normally incurred in shops requiring quick handling. It serves as an excellent base coat for a variety of topcoats which may be applied in the field.

RECOMMENDED USES: CARBO ZINC 10 is recommended for use where scheduling requires an easy to use, single coat, fast-drying shop or field primer which can be handled quickly and topcoated in the field. It is also very convenient as a repair or touch-up primer in the field.

NOT RECOMMENDED FOR: Direct exposure to acids or alkalies without suitable topcoat.

CHEMICAL RESISTANCE GUIDE:

Exposure*	Immersion	Heavy Fumes or Light Splash and Spillage	Outside Weathering or Mild Fumes
Acids	NR	Very Good	Excellent
Alkalies	NR	Very Good	Excellent
Solvents	Excellent	Excellent	Excellent
Salt	Excellent	Excellent	Excellent
Water	Excellent	Excellent	Excellent

*Certain exposures may require topcoats for maximum service.

TEMPERATURE RESISTANCE: (non-immersion)
Continuous: 750° F (399° C)
Non-continuous: 800° F (427° C)

FLEXIBILITY: Fair **WEATHERING:** Excellent

ABRASION RESISTANCE: Excellent — increases as the coating ages.

SUBSTRATES: Suitably prepared steel or others as recommended.

TOPCOAT REQUIRED: May be topcoated with epoxy, vinyl, silicone, chlorinated rubbers or others as recommended. Acceptable topcoats are CARBOLINE® 190HB, CARBOLINE 890, POLYCLAD D966 and POLYCLAD® 936. Consult Carboline Technical Service for specific recommendations. A mist coat is normally required when applying topcoats over CARBO ZINC 10.

NOTE: An epoxy tie-coat is required prior to the application of CARBOLINE 133 HB or CARBOMASTIC® 242.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Weight
CARBO ZINC 10	75% ± 2%**
Percent total zinc in the dry film	82% minimum

**This value is based upon theoretical considerations, assuming complete hydrolysis of the binder and removal of all volatile material from the film.

RECOMMENDED DRY FILM THICKNESS PER COAT:
2-3 mils (50-75 microns)
Note: Excessive film thickness may result in cracking.

THEORETICAL COVERAGE PER MIXED GALLON:***
840 mil sq. ft. (20.3 sq. m/l at 25 microns)
336 sq. ft. at 2-1/2 mils (7.8 sq. m/l at 65 microns)

***NOTE: Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: Nine months minimum when stored at 75° F (24° C).

COLORS: Green and Gray. Color may vary from batch to batch.

GLOSS: Matte

Prices may be obtained from your Carboline Sales Representative or Main Office.

APPROXIMATE SHIPPING WEIGHT:

	1'S	5'S
CARBO ZINC 10	20 lbs. (9 kg)	97 lbs. (44 kg)
CARBOLINE Thinner # 20	8 lbs. (4 kg)	37 lbs. (17 kg)
CARBOLINE Thinner # 26	9 lbs. (4 kg)	42 lbs. (19 kg)

FLASH POINT: (Pensky-Martens Closed Cup)

CARBO ZINC 10	45° F(7° C)
CARBOLINE Thinner # 20	55° F (13° C)
CARBOLINE Thinner # 26	104° F (40° C)

Jan. 87 Replaces Oct. 84-N

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining cor surface preparation, mixing instructions and application procedure. It is assumed that the proper product recommendations have b made. These instructions should be followed closely to obtain the maximum service from the materials.

0242

SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner # 2 in accordance with SSPC-SP 1-82.

Steel: For solvent immersion, abrasive blast to a Near White Metal Finish in accordance with SSPC-SP 10-85 to a degree of cleanliness in accordance with NACE # 2 to obtain a 1-3 mil (25-75 micron) blast profile. For non-immersion, abrasive blast to a Commercial Grade Finish in accordance with SSPC-SP 6-85 to a degree of cleanliness in accordance with NACE # 3 to obtain a 1-3 mil (25-75 micron) blast profile.

MIXING: Power mix to a uniform consistency before thinning. A good mechanical mixer is required such as a 5" diameter paddle or Jiffy mixer. Pour mixture through a 30 mesh screen. Thin up to 10% by volume with CARBOLINE Thinner # 20. For hot or windy conditions, use CARBOLINE Thinner # 26.

NOTE: Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

WORKING TIME: THIS MATERIAL IS MOISTURE SENSITIVE. Moisture contamination will shorten working time and cause gelation.

APPLICATION TEMPERATURES:

	Material	Surfaces	Ambient	Humidity
Normal	60-90° F (16-32° C)	60-110° F (16-43° C)	60-90° F (16-32° C)	50-90%
Minimum	40° F (4° C)	40° F (4° C)	40° F (4° C)	40%
Maximum	130° F (54° C)	200° F (93° C)	130° F (54° C)	95%

Do not apply when the surface temperature is less than 5° F (2° C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use sufficient air volume for correct operation of equipment. If spraying stops for more than 15 minutes, blow material from hose back into pot. Material must be continuously agitated.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edges first, making an extra pass later.

NOTE: The following equipment has been found suitable; however, equivalent equipment may be substituted.

Conventional: Use a 3/8" minimum I.D. material hos Maximum hose length should be 50 feet. Hold gun appro: mately 12-14 inches from the surface and at a right angle the surface.

Mfr. & Gun	Fluid Tip	Air Ca
Binks # 18 or # 62	66	63PE
DeVilbiss MBC or JGA	E	704
	Approx. .070" I.D.	

Airless: Use a 3/8" minimum I.D. material hose. Use a mesh in-line filter while spraying. Hold gun approximate 18-20 inches from the surface and at a right angle to t surface

Mfr. & Gun	Pump*
DeVilbiss JGB or JGN	QFA 519
Graco 208-663 or 205-591	Bulldog 30:
Binks Model 700 or 720	B8-36 37:1

*Teflon packings are recommended and are available fro manufacturer.

Use a .017-.021" tip with 1800 psi.

BRUSH OR ROLLER: For touch-up only. Stir during applic tion to prevent settling of zinc. Thin up to 12% by volun with CARBOLINE Thinner # 20.

DRYING TIMES: (At 50% Relative Humidity)

Temperature	Dry to Handle	Cure to Topco
50° F (10° C)	1 hour	48 hours
75° F (24° C)	1/2 hour	24 hours
90° F (32° C)	20 minutes	16 hours

CLEANUP: Use CARBOLINE Thinner # 2.

STORAGE CONDITIONS: (Store Indoors)
Temperature: 40-110° F (4-43° C) Humidity: 0-9C

NOTE:

A) To recoat CARBO ZINC 10, thin 50% by volume. App over clean existing CARBO ZINC 10.

B) CARBO ZINC 10 will skin if left in opened container. Sk does not affect performance and should be mixed thoroughly before using.

C) Excessive overspray may be removed with an alun num screen.

ENERIC TYPE: Self curing, zinc filled inorganic coating. Base and zinc filler mixed prior to application.

GENERAL PROPERTIES: A weldable inorganic zinc primer. Welds made over CARBO WELD 11 coated steel are equal in every respect to welds joining uncoated steel prior to fabrication. CARBO WELD 11 protects cathodically for periods exceeding 12 months in normal and marine environments. Weld spatter does not adhere to or damage the coating, Coated steel can be welded as quickly and easily as bare steel at production line speeds, with no loss in strength or consistency of the weld. Applied by conventional or airless spray methods. Dries to touch and can be handled in 3-5 minutes. May be topcoated with CARBO ZINC® 11 and most conventional paints and coatings.

RECOMMENDED USES: CARBO WELD 11 is used as a preconstruction primer in shipyards and fabricating shops. It has many cost saving advantages over conventional shop primers.

NOT RECOMMENDED FOR: Exposure to acid, alkalies or solutions outside a PH range of 5 to 10, without suitable topcoat.

CHEMICAL RESISTANCE GUIDE: (with proper topcoat)

Exposure	Immersion	Heavy Fumes or Light Splash and Spillage	Outside Weatherin or Mild FUR
Acids	NR	very Good	Excellent
Alkalies	NR	very Good	Excellent
Solvents	Excellent	Excellent	Excellent
Salt	NR	Excellent	Excellent
Water	NR	Excellent	Excellent

TEMPERATURE RESISTANCE: (non-immersion)
Continuous: 750°F (399°C)
(Non-continuous: 800°F (427°C)

FLEXIBILITY: Very Good **WEATHERING:** Excellent

ABRASION RESISTANCE: Excellent. The abrasion resistance of CARBO WELD 11 increases as the coating ages.

SUBSTRATES: Apply over suitably prepared steel, cast iron or others as recommended.

TOPCOAT REQUIRED: May be topcoated with CARBO ZINC 11, epoxies, epoxy-tars, vinyls, acrylics, chlorinated rubbers, silicones, Navy formulation 117 and 119. Consult with Carboline Technical Service for specific recommendations.

COMPATIBILITY WITH OTHER COATINGS: Apply directly to the substrate.

WELDING DATA: Automatic - CARBO WELD 11 applied at recommended thickness may be welded at speeds up to 48" per minute. This is dependent upon plate thickness and bead size. This includes the following processes: 1) Submerged arc; 2) Flux core; 3) Short arc; 4) Metal Inert Gas (MIG).

Hand – CARBO WELD 11 can be easily welded by all Electrodes with Ml L E numbers between 6010 and 10018.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Weight
CARB0 WELD 11	48% ± 2%
Percent total zinc in the dry film	85% ± 1%

RECOMMENDED DRY FILM THICKNESS PER COAT: 3/4 to 1 -1/2 roils (20-40 microns)

THEORETICAL COVERAGE PER MIXED GALLON*: 460 mil sq. ft. (1 1.5 sq. m/1 at 25 microns)

● **NOTE:** Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: (When stored at 75° F (24°C)

Base	18 months minimum
Zinc Filler	24 months minimum

COLORS: Gray only

GLOSS: Matte finish

Prices may be obtained from Carboline sales representative or main office.

APPROXIMATE SHIPPING WEIGHT:

	1's	3's	15's
CARBO WELD 11	14 lbs. (6.4 kg)	38 lbs. (17.3 kg)	184 lbs. (83.6 kg)
CARBOLINE® Thinrrer #33	9.0 lbs. (4.1 kg)	41 lbs. in 5's (18.6 kg)	
CARBOLINE Thinner #21	8.0 lbs. (3.6 kg)	36 lbs. in 5's (16.3 kg)	

FLASH POINT: (Pensky-Martens Closed Cup)

CARBO WELD 11 Base	52°F (11°C)
CARBOLINE Thinner =33	101°F (38°C)
CARBOLINE Thinner #21	53°F (12°C)

Sept. 84 Replaces Feb. 84

These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining co surface preparation, mixing instructions and application procedure. It is assumed that the proper product recommendations have been m These instructions should be followed closely to obtain the maximum service from the materials.

SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 or toluol in accordance with SSPC-SP1.

Steel: For immersion service, dry abrasive blast to a White Metal finish in accordance with SSPC-SP 5-82 to a degree of cleanliness in accordance with NACE #I to obtain a 1 to 1-1/2 mil (25-40 microns) blast profile. For non-immersion service, dry abrasive blast to a Commercial finish in accordance with SSPC-SP 6-82 to a degree of cleanliness in accordance with NACE #3 to obtain a 1 to 1-1/2 mil (25-40 microns) blast profile. The Horton pickling process is also acceptable – for other acceptable surface preparations consult the Technical Service Department.

MIXING: Power mix base, then combine with filler in the following proportions:

	1 Gal. Kit	3 Gal. Kit	15 Gal. Kit
CARB0 WELD 11 Base	1 gal. (partially filled)	3 gal. (partially filled)	three 5 gal. cans (partially filled)
Zinc Filler	4.9 lb. unit (2.2 kg)	14.6 lb. unit (6.6 kg)	73 lb. unit (33.1 kg)

Mix as supplied. Sift zinc filler slowly into base with continuous agitation. Mix until free of lumps. Pour mixture through a 30-mesh screen. When less than full kit is used, mix by weight 100 parts Base: 73 parts Zinc Filler. Thin up to 12% by volume with CARBOLINE Thinner #21 in cool weather (below 55° F (13°C]). For hot or windy conditions, use CARBOLINE Thinner #33.

NOTE: Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE: 48 hours at 75° F (24°C) and less at higher temperatures. Pot life ends when material becomes too viscous to use.

APPLICATION TEMPERATURES:

	Material	Surfaces
Normal	40-95°F (4-35°C)	40-110°F (4-43°C)
Minimum	0°F (–18°C)	0°F (–18°C)
Maximum	130°F (54°C)	200°F (93°C)
	Ambient	**Humidity**
Normal	40-95°F (4-35°C)	40-90%
Minimum	0°F (–18°C)	10%
Maximum	130°F (54°C)	95%

Do not apply when the surface temperature is less than 5°F (2°C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use sufficient air volume for correct operation of equipment.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edges first, making an extra pass later.

NOTE: The following equipment has been found suita however, equivalent equipment may be substituted.

Use agitated pot. Maximum 50 foot hose. Keep pot at s elevation as gun. I f spraying stops for more than 15 minu blow material from hose back into pot.

Conventional: Use a 3/8 inch minimum I.D. material h Hold gun approximately 12-14 inches from the surface a at a right angle to the surface.

Mfr. & Gun	Fluid Tip	Air Ca
Binks =18 or #62	66	63 PE
DeVilbiss MBC or JGA	E	704
	Approx. 0.070" I.D.	

Airless: Use a 3/8 inch minimum I.D. material hose. H gun approximately 18-20 inches from the surface and a right angle to the surface.

Mfr. & Gun	Pump*
Graco 208-663	Buildog 30:1 or President 30:
Binks Model 700	B5-18 or B8-36
DeVilbiss JGB or JGN	QFA-514 or QFA-519

***Revers-A-Clean tip is recommended. Use a .019-.023" tip with 1500-2000 psi.**

BRUSH OR ROLLER: For minor touch-up only. medium bristle brush. Apply with full brush and av rebrushing.

DRYING TIMES:

Temperature with over 50% RH	Before Handling*	Final Cu
0°F (–18°C)	2 hours	5 days
40°F (4°C)	40 minutes	12 hours
60°F (16°C)	15 minutes	6 hours
80°F (27°C)	5 minutes	4 hours
100°F (38°C)	3 minutes	2 hours

*Minimum times.

NOTE: CARBO WELD 11 will skin if left in open c Skin has no effect on performance, but should be remo before using.

VENTILATION & SAFETY: When used in tanks or ot enclosed areas, thorough air circulation must be presen must exist during and after application until the coatin cured. The ventilation system should be capable of venting the solvent vapor concentration from reaching lower explosion limit for the solvents used. In addition proper ventilation, fresh air respirators or fresh air ho must be used by all application personnel. Where flamma solvents exist, explosion-proof lighting equipment must used. Hypersensitive persons should wear clean protec clothing, gloves and/or protective cream on face, hands all exposed areas.

CLEAN UP: Use CARBOLINE Thinner #2 or xylol. move hardened material with 10% caustic soluti Caution: Caustic attacks aluminum.

STORAGE CONDITIONS: (Store indoors)
Temperature: 40-110°F (4-43°C) Humidity: 0-10

GENERIC TYPE: Self curing, inorganic zinc primer. The coating consists of a basic zinc silicate complex. Base and zinc filler mixed prior to application.

GENERAL PROPERTIES: An inorganic zinc base coat that protects steel galvanically, eliminating sub-film corrosion. Has outstanding application properties. Can be applied at the recommended thickness in one coat.

RECOMMENDED USES: CARBO ZINC 11 is used as a single coat protection of steel structures in weathering exposure and as a base coat for organic and inorganic topcoats in more severe services. Excellent for interiors and exteriors of storage tanks containing fuels and organic solvents. Has many uses as a maintenance primer with or without topcoats, depending on exposure. Used widely in chemical plants, paper mills, refineries and coastal or salt atmospheres including offshore structures.

NOT RECOMMENDED FOR: Immersion or indirect exposure to acids or alkalies without suitable topcoat.

CHEMICAL RESISTANCE GUIDE:

Exposure	Immersion	Heavy Fumes or Light Splash and Spillage	Outside Weathering or Mild Fumes
Acids	NR	Very Good	Excellent
Alkalies	NR	Very Good	Excellent
Solvents	Excellent	Excellent	Excellent
Salt	Excellent	Excellent	Excellent
Water	Excellent	Excellent	Excellent

● Certain exposures may require topcoats for maximum service.

TEMPERATURE RESISTANCE: (non-immersion)
Continuous: 750°F (399°C)
Non-continuous: 800°F (427°C)

FLEXIBILITY Fair-Good **WEATHERING:** Excellent

ABRASION RESISTANCE: Excellent

SUBSTRATES: Apply over properly prepared steel, or other surfaces as recommended.

TOPCOAT REQUIRED: May be topcoated with epoxies, phenolics, vinyls, acrylics, silicones, chlorinated rubbers or others as recommended.

NOTE: Under certain conditions a mist coat or tie coat is required to minimize topcoat bubbling.

Oct. 86 Replaces July 1986

COMPATIBILITY WITH OTHER COATINGS: Apply directly over substrate, CARBO WELD. 11 or other inorganic zincs as recommended.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Weight
CARBO ZINC 11	79% ± 2 %
Percent Total Zinc in Dry Film	86% ± 2%

RECOMMENDED DRY FILM THICKNESS PER COAT:
2.0-3.0 mils (50-75 microns)

NOTE: Apply material as close as possible to recommended dry film thickness. Excessive film thickness will result in mudcracking and sagging.

THEORETICAL COVERAGE PER MIXED GALLON:*
1000 mil sq. ft. (24.5 sq.m/l at 25 microns)
333 sq. ft. at 3 roils (8.2 sq.mil at 75 microns)

● **NOTE:** Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.

SHELF LIFE: (When stored at 75°F (24C°))
Base: 12 months minimum
Zinc Filler: 24 months minimum

COLORS: Gray or Green standard.

GLOSS: Matte Finish

Prices may be obtained from your Carboline Sales Representative or Main Office.

APPROXIMATE SHIPPING WEIGHT:

	1's	5's
CARBO ZINC 11	23 lbs. (10 kg)	113 lbs. (51 kg)
CARBOLINE THINNER #26	9 lbs. (4 kg)	42 lbs. (19 kg)
CARBOLINE Thinner #21	8 lbs. (4 kg)	36 lbs. (16 kg)

FLASHPOINT: (Pensky-Martens Closed Cup)

CARBO ZINC 11 Base	56°F (13°C)
CARBOLINE Thinner #26	95°F (35°C)
CARBOLINE Thinner #21	54°F (12°C)

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0250

SURFACE PREPARATION: Remove any oil *or* grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 in accordance with SSPC-SP 1-82.

Steel: For immersion service, abrasive blast to a White Metal finish in accordance with SSPC-SP 5-82 to a degree of cleanliness in accordance with NACE #1 *to* obtain a 1-3 mil (25-75 microns) blast profile. For non-immersion service, abrasive blast to a Commercial finish in accordance with SSPC-SP 6-82 to a degree of cleanliness in accordance with NACE #3 to obtain a 1-3 mil (25-75 micron) blast profile. For steel tank linings, welds should be continuous. Remove weld spatter, slag, and oxides caused from welding.

MIXING: Power mix base, then combine and mix in the following proportions:

	1 Gal Kit	5 Gal Kit
CARBO ZINC 11 Base	1 Gal. (partially filled)	5 Gal. (partially filled)
Zinc Filler	14.6 lb. unit	73 lb. unit

Mix as supplied. Sift zinc filler slowly into base with continuous agitation. Mix until free of lumps. Pour mixture through a 30 mesh screen. Thin, as required up to 12% by volume with CARBOLINE Thinner #21 in cool weather (below 60"F 116'C]). For warmer of windy conditions, use CARBOLINE Thinner #26 up to 12% by volume.

NOTE: Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE: Eight hours at 75°F (24°C) and less at higher temperatures. Pot life ends when coating becomes too viscous to use.

APPLICATION TEMPERATURES:

	Material	Surfaces	Ambient	Humidity
Normal	40-95°F (4–35°C)	40–110°F (4–43°C)	40–95°F (4–35°C)	40–90%
Minimum	0°F (–18°C)	0°F (–18°C)	0°F (–18°C)	30%
Maximum	130°F (54°C)	200°F (93°C)	130°F (54°C)	95%

Do not apply when the surface temperature is less than 5°F (2°C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY Use sufficient air volume for correct operation of equipment.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edges first, making an extra pass later.

NOTE The following equipment has been found suitable, however, equivalent equipment may be substituted.

Conventional: Use a 3/8" minimum I. D. material hose. Hold gun approximately 12-14 inches from the surface and at a right angle to the surface.

Use agitated pot, Maximum 50 foot hose. Keep pot at same elevation as gun. If spraying stops for more than 15 minutes, blow the material from hose back into pot

Mfr. & Gun	Fluid Tip	Air Cap
Binks #18 or #62	66	63PB
DeVilbiss P-MBC or JGA	E	704
	approx. .070" I.D.	

Airless: Use a 3/8" minimum 1.0. material hose. Hold gun appr mately 18-20 inches from the surface and at a right angle to surface. Keep material under mild agitation during application.

Mfr. & Gun	Pump*
DeVilbiss JGB-510	QFA-514 or QFA-519
Graco 208-663	President 30:1 or Bulldog 3
Binks Model 700	65-18 *or* 68-36

● Teflon packings are recommended and are available from pu manufacturer.

Use a .018-.023" tip with 1500-2000 psi.

BRUSH: For areas less than one square foot. For touch-up o using medium bristle brush. Avoid rebrushing.

DRYING TIMES:

Temperature with over 50% RH	Before Placing Into Service Untopcoated	Befor Topcoat
0°F (18°C)	7 days	7 day
40°F (4°C)	24 hours	48 hou
60°F (16°C)	16 hours	24 hou
80°F (27°C)	8 hours	18 hou
100°F (38°C)	6 hours	16 hou

"Represents minimum times. If allowed to weather, excess salting should be removed.

VENTILATION & SAFE When used as a tank lining or in closed areas, thorough air circulation must be used during after application until the coating is cured. The ventilation sys should be capable of preventing the solvent vapor concentra from reaching the lower explosion limit for the solvents used addition to proper ventilation, fresh air respirators or fresh hoods must be used by all application personnel. Where flam ble solvents exist, explosion-proof lighting equipment must used. Hypersensitive persons should wear clean protective cl ing, gloves and/or protective cream on face, hands and all expo areas.

CLEAN UP Use CARBOLINE Thinner #2.

STORAGE CONDITIONS: (Store Indoors)
Temperature: 40-1 l0°F (4-43°C) Humidity: 0-10

NOTE

a) To recoat fresh CARBO ZINC 11 — thin 50%. To recoat a CARBO ZINC 11 —thin normally. Apply over clean, dry CAR ZINC 11.

b) When CARBO ZINC 11 is used for immersion service unt coated where zinc pickup could be detrimental or when spray is evident and CARBO ZINC 11 is to be topcoated, rem loose zinc after curing by rubbing with aluminum screen *wi*

c) For interior application, or tank linings, if the relative humidit low, the curing time can be reduced by raising the rela humidity by steam or a water spray on the coated surface a allowing to dry for one hour at 75°F (24°C).

d) CARBO ZINC 11 will skin if left in opened container. Skin has effect on performance, but should be removed before using

CAUTION CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WE FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EOUIPME AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHE EXPLOSION HAZARDS EXIST. WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE A NONSPARKING SHOES.

GENERIC TYPE: Self curing, inorganic zinc primer.

GENERAL PROPERTIES: A high solids inorganic zinc rich primer that protects steel galvanically, eliminating sub film corrosion. CARBO ZINC D11 HS meets the most stringent VOC (Volatile Organic Content) regulations while providing the proven performance of alkyl silicate zinc rich technology. Features include:

. Less than 2.8 lbs/gal. VOC as applied.
. Outstanding application properties.
. Excellent corrosion protection.
. Excellent resistance to salting.
. Increased zinc loading per square foot.
. Dense, hard coating film.
● Mixed as instructed — Material is prethinned.

RECOMMENDED USES: CARBO ZINC D11 HS is used as a prime coat for abrasive blasted steel where inorganic zinc is preferred and VOC regulations apply. Excellent for chemical plants, paper mills, refineries, highway bridges and coastal or salt atmospheres including offshore. Has many uses as a maintenance primer, with or without topcoats, depending on exposure. CARBO ZINC D11 HS is recommended whenever a state of the art technology inorganic zinc rich primer is desired.

NOT RECOMMENDED FOR: Indirect exposure to or immersion in acids or alkalies without suitable topcoat.

TYPICAL CHEMICAL RESISTANCE:*

Exposure	Immersion	Heavy Fumes or Splash and Spillage	Outside Weathering or Mild Fumes
Acids	NR	Very Good	Excellent
Alkalies	NR	Very Good	Excellent
Solvents	Excellent	Excellent	Excellent
Salt	Excellent	Excellent	Excellent
Water	Excellent	Excellent	Excellent

● Certain exposures will require topcoats. Consult Carboline Technical Service for details.

TEMPERATURE RESISTANCE: (Dry)
Continuous: 750° F (399° C)
Non-Continuous: 800° F (427° C)

SUBSTRATES: Apply over properly prepared steel.

Compatible COATINGS: Apply directly to substrate, CARBO WELD® 11 or other inorganic zincs as recommended. May be topcoated with epoxies, phenolics, vinyls, acrylics, silicones, chlorinated rubbers or others as recommended.

NOTE: Under certain conditions a mist coat or tie coat is required to minimize topcoat bubbling.

SOLIDS CONTENT OF MIXED MATERIAL

	By Weight
CARBO ZINCD11 HS	94% 2%
Percent total zinc in dry film	8±4% 1%

● As per a modified ASTM D1644. Method A.

VOLATILE ORGANIC CONTENT
AS SUPPLIED: (per mixing instructions)
Base, Zinc Filler and Activator: 2.20 lbs./gal. (264 gl)

THINNED: The following are nominal values utilizing CARBOLINE Thinner #26 or additional CARBO ZINC HS Activator:

% Thinned	fluid Ounces/Gal.	Pounds/ Gallon	Grams/ Liter
3%	4	2.36	283
6%	8	2.51	301
9%	12	2.65	317

RECOMMENDED DRY FILM THICKNESS PER COAT:
2-3 mils (50-75 microns)

Dry film thicknesses in excess of 6 roils (150 microns) per coat are not recommended.

THEORETICAL COVERAGE PER MIXED GALLON:
1300 mil sq. ft. (32.4 sq. m/l at 25 microns)
433 sq. ft. at 3 roils (10.8 sq. m/l at 75 microns)

Mixing and application losses will vary and must be taken into consideration when estimating job requirements.

STORAGE CONDITIONS: Store'Indoors
Temperature: 40-110" F (4-43° C)
Humidity: 0-90%

SHELF LIFE: Six months minimum when stored at 75° F (24° C).

COLORS: Green (0300) is standard.

GLOSS: Matte

Prices may be obtained from your Carboline Sales Representative or Carboline Customer Service Department.

APPROXIMATE SHIPPING WEIGHT:

	2/3 Gal. Kit	3-1/3 Gal. Kit
CARBO ZINC D11 HS	21 lbs. (10 kg)	101 lbs. (46 kg)
CARBO ZINC HS Activator	9 lbs. (4kg) in 1's	42 lbs. (19 kg) in 5's
CARBOLINE Thinner #26	9 lbs. (4 kg) in 1's	42 lbs. (19 kg) in 6's

FLASH POINT: (Pensky-Martens Closed Cup)

CARBO ZINC D11 HS Base	55° F (13° C)
CARBO ZINC HS Activator	91° F (32° C)
CARBOLINE Thinner #26	95° F (35° C)

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These instructions are not intended to show product recommendations for specific service. They are Issued as an and in determining correct surface preparation, mixi instructions and application procedure. It is assumed that the proper product recommendations have been made. **These instructions should be followed closely to obta the maximum service from the materials.**

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SURFACE PREPARATION: Remove oil or grease from surface with clean rags soaked in CARBOLINE Thinner # 2 or Surface Cleaner # 3(Refer to Surface Cleaner # 3 instructions) in accordance with SSPC-SP 1.

Steel: IMMERSION SERVICE: Abrasive blast to a White Metal Finish in accordance with SSPC-SP 5 (NACE # 1) to obtain a 1-3 mil (25-75 micron) blast profile. NON-IMMERSION SERVICE: Abrasive blast to a Commercial Finish in accordance with SSPC-SP 6 (NACE # 3) to obtain a 1-3 mil (25-75 microns) blast profile. For other acceptable surface preparations consult the Technical Service Department. For steel tank linings, welds must be continuous. Remove weld spatter, slag and oxides caused from welding.

MIXING: Power mix base, then combine as follows:

	2/3 Gal. Kit	3-1/3 Gal Kit
CARBO ZINC DII HS BASE	1 gallon (partially filled)	5 gallon (partially filled)
CARBOLINE Zinc Filler	14.6 lb. unit	73 lb. unit
CARBO ZINC HS Activator*	6 fl. OZ.	32 fl. OZ. (1 quart)

Sift zinc filler slowly into premixed base with continuous agitation. Mix until free of lumps. Then add activator. Pour mixture through a 30 mesh screen. DO NOT MIX PARTIAL KITS.

*Unless CARBO ZINC HS Activator is utilized in these minimum quantities the product will not cure.

THINNING: When mixed as instructed above, material is prethinned, ready to spray. Additional thinning is not normally required for airless application.

For conventional spray or hot and windy conditions, may be thinned up to 9% (12 fl.oz./gal.) by volume with CARBOLINE Thinner #26.

CARBO ZINC HS Activator may be substituted for CARBOLINE Thinner #26.

Refer to Specification Data For VOC information.

Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE: Six hours at 75° F (24° C) and less at higher temperatures. Pot life ends when coating becomes too viscous to use.

APPLICATION CONDITIONS:

	Material	Surfaces	Ambient	Humidit
Normal	60-85° F (16-29° C)	50-95° F (10-35° C)	50-95° F (10-35° F)	40-90%
Minimum	50° F (10° C)	20° F (–7° C)	35° F (2° C)	30%
Maximum	95° F (35° C)	150° F (66° C)	120° F (49° C)	95%

Do not apply when the surface temperature is less than 5° F (or 2° above the dew point.

SPRAY: The following spray equipment has been foun suitable and is available from manufacturers such a Binks, DeVilbiss and Graco. Airless gun available fror Speeflo Mfg. Corp.

Airless:

Gun: Speeflo "H" gun with heavy duty trigger spring an color coded pre-orifice for tip used.
Pump Ratio: 30:1 (min.)*
Tip Size: .017-.019"
GPM Output: 3.0 (min.)
Output psi: 1750-2250
Material Hose: 3/8" I.D. (min.)
Filter Size: 60 mesh

Hold gun approximately 10-14 inches from the surfac and at a right angle to the surface. Keep material unde mild agitation during application.

*Teflon packings are recommended and are availabl from the pump manufacturer.

Conventional: Pressure pot equipped with dual regulator agitated pot, 3/8" I.D. minimum material hose, .070" I.I fluid tip and appropriate air cap. Hold gun approximatel 6-8 inches from the surface and at a right angle to th surface.

BRUSH: For touch-up only, areas less than one square foo Use medium bristle brush. Avoid rebrushing. Do nc apply by roller.

DRYING TIMES: These times are at 3 mils (75 microns) dr film thickness. Higher thicknesses will lengthen cur times.

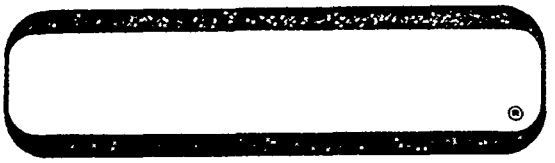
Temperatures With over 50% R.H.	Dry to Handle	Dry to Topcoa
40° F (5° C)	4 hours	72 hours
75° F (24° C)	1 hour	18 hours
100° F (38° C)	45 minutes	14 hours

CLEANUP: Use CARBOLINE Thinner # 2.

CAUTION: READ AND FOLLOW ALL CAUTION STATEMENT ON THIS PRODUCT DATA SHEET AND ON THE MATERIA SAFETY DATA SHEET FOR THIS PRODUCT.

CAUTION CONTAINS FLAMMABLE SOLVENTS. KEEP AWAY FROM SPARKS AND OPEN FLAMES. IN CONFINED AREAS WORKMEN MUST WEAR FRESH AIRLINE RESPIRATORS. HYPERSENSITIVE PERSONS SHOULD WEAR GLOVES OR USE PROTECTIVE CREAM. ALL ELECTRIC EOUIPMENT AND INSTALLATIONS SHOULD BE MADE AND GROUNDED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE. IN AREAS WHERE EXPLOSION HAZARDS EXIST. WORKMEN SHOULD BE REQUIRED TO USE NONFERROUS TOOLS AND TO WEAR CONDUCTIVE AND NONSPARKING SHOES..

product data sheet



GENERIC TYPE: Self-curing inorganic zinc primer. The coating consists of a basic zinc silicate complex. Base and zinc filler mixed prior to application.

GENERAL PROPERTIES: CARBO ZINC 12 is a self-curing inorganic zinc coating for the protection of steel surfaces against rust and corrosion. It protects galvanically and prevents undercutting corrosion. CARBO ZINC 12 has excellent application properties in the field or shop. Becomes water insoluble 20 minutes after application. Meets or exceeds all requirements of Steel Structures Painting Council Specification, SSPC 12.00 for inorganic zinc coatings. Future expensive surface preparation is avoided. Develops hardness rapidly and may be topcoated the same day. Refer to Drying Times chart for topcoating.

RECOMMENDED USES: CARBO ZINC 12 is recommended for use as a single coat for protection of steel structures in many weathering exposures. CARBO ZINC 12 is used as a base coat with appropriate topcoats in corrosive atmospheres and other severe services. Excellent for long-term protection of structural steel, equipment, cargo containers, tank exteriors, railings, cranes, steel decking, bridges, and exteriors of barges, workboats and ships.

NOT RECOMMENDED FOR: Most tank lining applications, or exposure to acids or alkalies outside the PH range of 10 to 5 without a suitable topcoat.

CHEMICAL RESISTANCE GUIDE: (with proper topcoat)

Exposure	immersion	Heavy Fumes or Light Splash and Spillage	Outside Weathering or Mild Fumes
Acids	NR	Very Good	Excellent
Alkalies	NR	Very Good	Excellent
Solvents	Excellent	Excellent	Excellent
Salt	NR	Excellent	Excellent
Water	NR	Excellent	Excellent

TEMPERATURE RESISTANCE: (non-immersion)
Continuous: 750°F (399°C)
Non-continuous: 800°F (427°C)

FLEXIBILITY: Fair **WEATHERING: Excellent**

ABRASION RESISTANCE: Excellent. Abrasion resistance increases with age.

SUBSTRATES: Apply to properly prepared carbon steel, cast iron or other surfaces as recommended.

TOPCOAT REQUIRED: Can be topcoated with epoxy, vinyl, acrylic, silicone and chlorinated rubber topcoats or others as recommended.

NOTE: Under certain conditions a mist coat or tie coat is required to minimize topcoat bubbling.

COMPATIBILITY WITH OTHER COATINGS: Apply directly over substrate, CARBO WELD. 11 or other inorganic zincs as recommended.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

	By Weight	
CARBO ZINC 12	73%	2%
Percent Total Zinc in the dry film	75%	1%

RECOMMENDED DRY FILM THICKNESS PER COAT:
2-3 roils (50-75 microns)

THEORETICAL COVERAGE PER MIXED GALLON*:
1000 mil sq. ft. (24.5 sq.m/l at 25 microns)
333 sq. ft. at 3 roils (8.2 sq.m/l at 75 microns)

● **NOTE: Material losses during mixing and application will vary and must be taken into consideration when estimating job requirements.**

SHELF LIFE: (when stored at 75°F (24°C))
Base — 12 months minimum
Zinc Filler — 24 months minimum

COLORS: Green only

GLOSS: Matte Finish

Prices may be obtained from your Carboline Sales Representative or Main Office.

APPROXIMATE SHIPPING WEIGHT:

	1's	5's
CARBO ZINC 12	20 lbs. (9 kg)	95 lbs. (43 kg)
CARBOLINE Thinner #26	9 lbs. (4 kg)	41 lbs. (19 kg)
CARBOLINE Thinner #21	8 lbs. (4 kg)	36 lbs. (16 kg)

FLASH POINT: (Pensky-Martens Closed Cup)

CARBO ZINC 12 Base	59°F (15°C)
CARBOLINE Thinner #26	95°F (35°C)
CARBOLINE Thinner #21	54°F (12°C)

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SURFACE PREPARATION: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 in accordance with SSPC-SP 1.

Steel: For immersion service, abrasive blast to a White Metal finish in accordance with SSPC-SP 5-82 to a degree of cleanliness in accordance with NACE #1 to obtain a 1–3 mil (25–75 microns) blast profile. For non-immersion service,* abrasive blast to a Commercial finish in accordance with SSPC-SP 6-82 to a degree of cleanliness in accordance with NACE #3 to obtain a 1–3 mil (25–75 microns) blast profile.

*For non-immersion marine service or exposure to salt, abrasive blast to a Near White finish in accordance with SSPC-SP 10-82 to a degree of cleanliness in accordance with NACE #2 to obtain a 1–3 mil (25–75 micron) blast profile.

MIXING: Power mix base separately, then combine and mix in the following proportions:

	1 Gal Kit	5 Gal Kit
CARBO ZINC 12 Base	1 Gallon (partially filled)	5 Gallons (partially filled)
Zinc Filler	10 lb. unit	50 lb. unit

Mix as supplied. Sift zinc filler slowly into base with continuous agitation. Mix until free of lumps. Pour mixture through a 30 mesh screen. When less than full kit is used, mix by weight 4 parts Base, 5 parts Zinc Filler. Thin up to 12% by volume with CARBOLINE Thinner #21 in cool weather (below 55°F (13°C)). For warmer or windy conditions, use CARBOLINE Thinner #26.

NOTE: Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE: Eight hours at 75°F (24°C) and less at higher temperatures. Pot life ends when coating becomes too viscous to use.

APPLICATION TEMPERATURES:

	Material	Surfaces	Ambient	Humidity
Normal	40–95°F (4–35°C)	40–110°F (4–43°C)	40–95°F (4–35°C)	40–90%
Minimum	0°F (–18°C)	0°F (–18°C)	0°F (–18°C)	30%
Maximum	130°F (54°C)	200°F (93°C)	130°F (54°C)	95%

Do not apply when the surface temperature is less than 5°F (2°C) above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: Use sufficient air volume for correct operation of equipment.

Use a 50% overlap with each pass of the gun. On irregular surfaces, coat the edges first, making an extra pass later.

NOTE: The following equipment has been found suitab however, equivalent equipment may be substituted.

Conventional: Use a 3/8" minimum I.D. material hose. Ho gun approximately 12–14 inches from the surface and a right angle to the surface.

Use agitated pot. Maximum 50 feet hose. Keep pot at sar elevation as gun. If spraying stops for more than 15 mi utes, blow material from hose back into pot.

Mfr. & Gun	Fluid Tip	Air C
Binks #18 or #62	66	63P
DeVilbiss MBC or JGA	E	704
	approx. .070" I.D.	

Airless: Use a 3/8" minimum I.D. material hose. Hold g approximately 18–20 inches from the surface and at a rig angle to the surface. Keep material under mild agitati during application.

Mfr. & Gun	Pump*
DeVilbiss JGN or JGB	QFA-514 or QFA-519 32:1
Graco 205-591 or 208-663	President 30:1 or Bulldog 30
Binks Model 700	B8-36 37:1

*Teflon packings are recommended and are available fro pump manufacturer. Use a .019–.023" tip with 1500–20 psi.

BRUSH: For touch-up only. Use natural, medium bris brush, applying with full strokes. Avoid rebrushing.

DRYING TIMES:

Temperature with over 50% RH	Time Before Topcoating*
0°F (–18°C)	5 days
40°F (4°C)	24 hours
60°F (16°C)	16 hours
80°F (27°C)	12 hours
100°F (38°C)	6 hours

*Represents minimum times. If allowed to weather long excessive salts should be removed.

CLEANUP: Use CARBOLINE Thinner #2.

STORAGE CONDITIONS: (Store Indoors)

Temperature: 40–110°F (4–43°C) Humidity: 0–10

NOTE:

a) To recoat CARBO ZINC 12 — thin 50%. Apply ov clean dry CARBO ZINC 12.

b) CARBO ZINC 12 will skin if left in opened containe Skin does not affect performance, but should be r moved before using.

c) Excessive over spray may be removed with an alun rum screen.

GENERIC TYPE: Three component, zinc filled, cross-linked epoxy primer.

GENERAL PROPERTIES: CARBOLINE D858 is a high solids, organic zinc primer for protection of structural steel in salt or weathering environments. Features include:

- Less than 2.8 lbs./gal. VOC as applied.
- Outstanding application properties.
- May be topcoated in three hours at 75° F (24° C).
- Hard tough film.
- Excellent adhesion and undercutting resistance.
- Material is prethinned — Ready to spray.
- CARBOLINE D858 meets the most stringent VOC (Volatile Organic Content) regulations.

RECOMMENDED USES: Excellent as a maintenance or general use zinc primer over commercially blasted steel that will be topcoated. Used for structural steel and equipment in pulp and paper, petrochemical, chemical processing and other severe environments with appropriate topcoat. Recommended in a shop environment where quick recoat and cure times are desired and where VOC regulations restrict the use of non-compliant coatings.

NOT RECOMMENDED FOR: Immersion service, or severe corrosive environments; strong acids or alkalies.

TYPICAL CHEMICAL RESISTANCE: (With proper topcoat)

Exposure	Heavy Fumes or Light Splash & Spillage	Outside Weathering or Mild Fumes
Acids	Very Good	Excellent
Alkalies	Very Good	Excellent
Solvents	Very Good	Excellent
Salt	Excellent	Excellent
Water	Excellent	Excellent

TEMPERATURE RESISTANCE: (Non-immersion)
Continuous: 180° F (82° C)
Non-continuous: 230° F (110° C)

SUBSTRATES: Apply to properly prepared steel or others as recommended.

COMPATIBLE COATINGS: May be topcoated with CARBOLINE 890, CARBOLINE D834, CARBOLINE 893, CARBOLINE 893 RCP. For other specific topcoat recommendations, consult Carboline Technical Service Department.

THEORETICAL SOLIDS CONTENT OF MIXED MATERIAL:

CARBOLINE D858	64% ± 2%	By Volume
Percent Total Zinc In Dry Film	81% ± 2%	By Weight

VOLATILE ORGANIC CONTENT:
The following are nominal values.
As Supplied: 2.52 lbs./gal. (303 gm./liter).
Thinned: Utilizing CARBOLINE Thinner #2 or CARBOLINE Thinner #33.

% Thinned	Fluid Ounces/Gal.	Pounds/ Gallon	Grams/ Liter
3%	4	2.67	320
6%	8	2.80	335

RECOMMENDED DRY FILM THICKNESS PER COAT:
3 mils (75 microns)
Dry film thicknesses in excess of 6 mils (150 microns) per coat are not recommended. Excessive film thickness may increase damage during shipping or erection.

THEORETICAL COVERAGE:
1027 mil sq. ft. (25.6 sq. m/l at 25 microns) per mixed gallon
342 sq. ft. at 3 mils (8.5 sq. m/l at 75 microns) per mixed gallon
274 sq. ft. at 3 mils (6.8 sq. m/l at 75 microns) per 0.8 gallon kit
1369 sq. ft. at 3 mils (34.1 sq. m/l at 75 microns) per 4 gallon kit
Mixing and application losses will vary and must be taken into consideration when estimating job requirements.

STORAGE CONDITIONS: Store Indoors
Temperature: 40-110° F (4-43° C) Humidity: 0-95%

SHELF LIFE: Part A: 12 months at 75° F (24° C)
Part B: 12 months at 75° F (24° C)
Carboline Zinc Filler: 24 months at 75° F (24° C)

COLORS: Green (0300) only.

GLOSS: Matte

Prices may be obtained from your local Carboline Sales Representative or Customer Service Representative.

APPROXIMATE SHIPPING WEIGHT:

	0.8 Gal. Kit	4 Gal. Kit
CARBOLINE D858	22 lbs. (10 kg)	105 lbs. (48 kg)
CARBOLINE Thinner #2	9 lbs. in 1's	45 lbs. in 5's
CARBOLINE Thinner #33	9 lbs. in 1's	45 lbs. in 5's

FLASH POINT: (Pensky-Martens Closed Cup)

CARBOLINE D858 Part A	48° F (9° C)
CARBOLINE D858 Part B	38° F (3° C)
CARBOLINE Thinner #2	24° F (–5° C)
CARBOLINE Thinner #33	91° F (33° C)

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These instructions are not intended to show product recommendations for specific service. They are issued as an aid in determining correct surface preparation, mi instructions and application procedure. It is assumed that the proper product recommendations have been made. These instructions should be followed closely to ob the maximum service from the materials.

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SURFACE PREPARATIONS: Remove any oil or grease from surface to be coated with clean rags soaked in CARBOLINE Thinner #2 or Surface Cleaner #3 (refer to Surface Cleaner #3 instructions) in accordance with SSPC-SP 1.

Steel: Apply over clean, dry steel, dry abrasive blasted to a commercial finish in accordance with SSPC-SP 6 (NACE #3) to obtain a 1-2 mil (25-50 microns) blast profile.

MIXING: Mix Part A separately and slowly sift in zinc filler under agitation. Mix Part B separately and add slowly using the following proportions:

	0.8 Gal. Kit	4 Gal. Kit
Carboline D858 Part A	0.35 gallon (Partial filled 1 gallon can)	1.75 gallons (Partial filled 5 gallon can)
Carboline D858 Part B	0.20 gallon (in 1 quart can)	1.00 gallon
Carboline Zinc Filler	14.6 lb. unit	73 lb. unit

DO NOT MIX PARTIAL KITS.

THINNING: Normally thinning is not required. If necessary due to application conditions, it may be thinned up to 6% by volume (8 fluid ounces per gallon) with CARBOLINE Thinner #2. In hot or windy conditions it may be thinned up to 6% by volume with CARBOLINE Thinner #33.

Use of thinners other than those supplied or approved by Carboline may adversely affect product performance and void product warranty, whether express or implied.

POT LIFE: Four hours at 75° F (24° C) and less at higher temperatures. Pot life ends when coating loses body and begins to sag.

APPLICATION CONDITIONS:

	Material	Surfaces	Ambient	Humidity
Normal	60-85° F (16-29° C)	60-90° F (16-32° C)	60-90° F (16-32° C)	0-90%
Minimum	50° F (10° C)	50° F (10° C)	50° F (10° C)	0%
Maximum	90° F (32° C)	120° F (49° C)	110° F (43° C)	95%

Do not apply when the surface temperature is less than 5° F or 2° C above the dew point.

Special thinning and application techniques may be required above or below normal conditions.

SPRAY: The following spray equipment has been fou suitable and is available from manufacturers such Binks, DeVilbiss and Graco.

Conventional: Pressure pot equipped with dual regulat 3/8" I.D. minimum material hose, 0.070" I.D. fluid tip a appropriate air cap.

Airless:
Pump Ratio: 30:1 (min.)*
GPM Output: 3.0 (min.)
Material Hose: 3/8" I.D. (min.)
Tip Size: 0.017"
Output psi: 2000-2200
Filter Size: 60 mesh

*Teflon packings are recommended and are availa from the pump manufacturer.

BRUSH OR ROLLER: Not recommended for use witl roller. Brush for touch-up only. Use medium bristle a avoid rebrushing.

DRYING TIMES: These times are at 3 mils (75 microns) film thickness. Higher film thicknesses or excessive th ning will lengthen topcoat and cure times.

Dry to touch at 75° F — ½ hour

Temperature	Dry to Handle*	Dry to Topco
50° F (10° C)	5 hours	6 hours
60° F (16° C)	3 hours	4 hours
75° F (24° C)	2 hours	3 hours
90° F (32° C)	1 hour	1½ hours

*Minimum times. Weathering beyond 30 days may quire special surface preparation before topcoating. C sult Carboline Technical Service for detailed informati

CLEANUP: Use Carboline Thinner # 2.

CAUTION: READ AND FOLLOW ALL CAUTION STAT MENTS ON THIS PRODUCT DATA SHEET AND THE MATERIAL SAFETY DATA SHEET FOR THE PRODUCTS.

DEVOE COATINGS COMPANY

4000 DUPONT CIRCLE

P.O. BOX 7600

LOUISVILLE, KENTUCKY 40207

Generic Type	Company Designation	VOC Content*	Cost Relative to Non-Complying Solvents	Availability	History In Marine Servic (Yes or No)
Alkali Silicate Post Cure Zinc	Catha-Coat 300	0	----	Available	Yes
Alkali Silicate Zinc Self Cure	Catha-Coat 305	0	----	"	Yes
Alkyl Silicate Zinc Self Cure	Catha-Coat 304	529 g/l good to 9/94	----	"	Yes
Reinforced Inorganic Zinc Primer	Catha-Coat 318	382 g/l good to 9/94	----	"	Yes
Epoxy Pre Primer	Pre-Prime 167	0	----	"	Yes
Epoxy Tank Coating	Devran 184	0	----	"	Yes
Epoxy Hull Coating	Devran 188	0	----	"	Yes
Epoxy Hull Coating	Devtar 5A	302 g/l	----	"	Yes
Epoxy High Build	Devran 224	340 g/l	----	"	Yes
Epoxy Hull Coating	Devran 230	298 g/l	----	"	Yes
Epoxy High Build	Devran 234QC	275 g/l	----	"	Yes
Tolerant Epoxy	Bar-Rust 235	287 g/l	----	"	Yes
Tolerant Epoxy	Bar-Rust 236	170 g/l	----	"	Yes
Abrasion Resistant Epoxy	Devguard 238	214 g/l	----	"	Yes

*Excludes

Generic Type	Company Designation	VOC Content*	Cost Relative to Non-Complying Solvents	Availability	History In Marine Service (Yes or No)
Epoxy Mastic	Bar-Rust 239	86 g/l	----	Available	Yes
Epoxy Mastic	Devtar 247	206 g/l	----	"	Yes
High Build Gloss Epoxy	Devran 250	353 g/l	----	"	Yes
Epoxy Polyester Gloss	Devran 260	340 g/l	----	"	Yes
Water Based Epoxy High Build Primer	Devran 646	39 g/l	----	"	Yes
High Build Tank Coating	Devran 648	60 g/l	----	"	Yes
Water Based Epoxy Enamel	Devran 669	358 g/l to 9/91	----	"	Yes
Urethane Gloss Enamel	Devthane 359	383 g/l to 9/91	----	"	Yes
Urethane Gloss Enamel	Devthane 369	419 g/l to 9/91	----	"	Yes
Fire Retardant Latex	Devflex 601	120 g/l	----	"	Yes
Marine Grade Latex Enamel Semi-Gloss	Devflex 602	100 g/l	----	"	Yes
Wash Primer	Vy-Kote 443	660 g/l to 9/94	----	"	Yes

*Excludes Water, See Reg 8, Rule 43

Generic Type	Company Designation	VOC Content*	Cost Relative to Non-Complying Solvents	Availability	History In Marine Servic (Yes or No)
Alkyd Primer	Bar-Ox 461	335 g/l	Higher	Available	Yes
Alkyd Gloss Enamel	Bar-Ox 462	337 g/l	Higher	"	Yes
Silicone Alkyd Gloss Enamel	Bar-Ox 475	419 g/l to 9/91	----	"	Yes
Antifouling	Devran 214	438 g/l to 9/92	----	"	Yes
Antifouling	Devran 218	427 g/l to 9/92	----	"	Yes
Antifouling	Super Tropical 280	315 g/l	----	"	Yes
Antifouling	ABC #2	415 g/l to 9/92	----	"	Yes
Antifouling	ABC #3	407 g/l to 9/92	----	"	Yes
Epoxy Non-Skid Primer	Devgrip 137	280 g/l	----	"	Yes
Epoxy Non-Skid Primer	Devgrip 137	0	----	"	Yes
Epoxy Non-Skid	Devgrip 137 A-AR-H-HR	0	----	"	Yes
Epoxy Non-Skid	Devgrip 237 AR-H-HR-M	All Under 300 g/l	----	"	Yes

Generic Type	Company Designation	VOC Content*	Cost Relative to Non-Complying Solvents	Availability	History In Marine Servic (Yes or No)
Heat Resistant Silicone	HT-8	448 g/l	----	Available	Yes
Heat Resistant Epoxy	HT-403	321 g/l	----	"	Yes
Epoxy Tank Coating	Devran 241	239 g/l	----	"	Yes
Epoxy Tank Coating	Devran 244 HS	78 g/l	----	"	Yes
Epoxy Tank Coating	Devchem 253	239 g/l	----	"	Yes
Epoxy Patching Compound	Devran 140	0	----	"	Yes
Epoxy Splash Zone Coating	Devclad 182	0	----	"	Yes

*Excludes Water, See Reg 8, Rule 43

INORGANIC COATINGS, INC.

1 GREAT VALLEY PARKWAY, SUITE 8

MALVERN, PA. 19355

Generic Type	Company Designation	VOC Content*	Cost Relative to Non-Complying Solvents	Availability	History In Marine Service (Yes or No)
ORGANIC ZINC (ETHYL BASED HIGH RATIO SILICATE/ZINC	IC. 531	0	SLIGHTLY HIGHER - BUT COMPETATIVE WHEN ALL FACTORS CONSIDERED	NATION WIDE - SOME INTERNATIONAL DISTRIBUTION	EXTENSIVE ONSHORE AND BRIDGE HISTORY - NAVSEA APPROVED CHAPTER 631.
AMINE EPOXY (WATER BASED)	IC PW20	.5 lbs/gal			SMALL - USED AS TOPCOAT FOR INTERIORS OF STATUE OF LIBERTY. ALSO USED AS TOPCOAT FOR BRIDGES AND IN A MAINTENANCE COATING. BEGINNING TESTING [illegible]
ACRYLIC (WATER BASED)	IC 46	.67 lbs/gal			LITTLE - EXTENSIVE USE AS A BARRIER COAT
ETHANE (INORGANIC)	IC 64	2.96 lbs/gal			NONE
AMINE EPOXY (HI BUILD)	IC P24	1.8 lbs/gal	COMPETATIVE		LIMITED - BEGINNING TESTING TO DOD-P-23236
AMIDE EPOXY (LOW TEMP CURE)	IC P25	3.0 lbs/gal	COMPETATIVE		LIMITED
INT CURE EPOXY (LOW TEMP CURE)	IC A26	2.4 lb/gal	SLIGHTLY HIGHER		EXTENSIVE

*Excludes Water, See Reg 8, Rule 43

531*

INORGANIC ZINC

IC 531 IS A WATER-BASED, FAST DRYING, INORGANIC ZINC COATING CHARACTERIZED BY ITS HIGH-RATIO POTASSIUM SILICATE FORMULA, (5.3:1 SiO_2:K_2O)

IC 531 ADVANTAGES

FAST DRYING - IC 531 dries to maximum hardness and adhesion in 30 minutes or less. No curing by hydrolization is necessary.

ABRASION RESISTANCE - IC 531's high SiO_2 content produces a very hard film in 30 minutes or less.

SOLVENT & MOISTURE RESISTANCE - IC 531 is water insoluble and solvent proof in 30 minutes or less. May be top-coated with water or solvent-based paints in two hours.

SAFETY & ENVIRONMENTAL - IC 531 is non-toxic, non-flammable and has no organic solvent emissions.

APPLICATION - IC 531 mixes easily and applies easily with conventional equipment.

EASY TOUCH-UP - With brush or spray, one hour or one year after original application.

SURFACE PREPARATION - IC 531 achieves maximum adhesion over an SSPC SP-6, commercial blast. An SSPC SP-10, near white blast should be employed for severe service.

SPECIFICATIONS

ZINC IN DRY FILM: 86% by Weight (minimum)

SOLIDS: 79% by Weight
68% by Volume

RECOMMENDED DRY FILM:

Topcoated: 3 mils minimum
Untopcoated: 4 mils minimum

THEORETICAL COVERAGE:

3 mils DFT - 365 ft^2/gallon
4 mils DFT - 272 ft^2/gallon

APPLICATION TEMPERATURE:

Surface and ambient temperatures between 40°F and 120°F

VISCOSITY @ 70°F: 15-22 seconds #2 Zahn Cup

COLOR: Zinc Gray

SHELF LIFE: Vehicle - 12 months min
Zinc - 12 months min.

POT LIFE: 8 hours minimum (Thinned)

WEIGHT/GALLON: 24.6 lbs. ± ½ lb.

DRYING TIME: 15-30 minutes @ 70°F and less than 85% R.H. Topcoat in 2 hours.

HEAT RESISTANCE: Continuous up to 750°F dry.

VOC's: 0

STORAGE: Between 35°F and 120°F

Inorganic Coatings, Inc., 1 Great Valley Parkway, Suite 8, Malvern, PA 19355 215 640 2880

SURFACE PREPARATION

NEW STEEL - Blast clean to SSPC SP-10, near white. When using centrifugal equipment, clean blast media provides best results.

OLD STEEL - Remove all old paint in accordance with SSPC SP-6, commercial blast. For immersion, industrial or marine service, an SSPC SP-10, near white blast is recommended.

SINGLE COAT SYSTEM - When IC 531 is used without a topcoat, an SSPC SP-10, near white, blast is recommended.

TOUCH-UP - Remove dirt and contamination with clear water or an SSPC SP-7 brush blast. Do not-use solvents.

THINNING AND MIXING

See thinning instructions on Part 1 vehicle lid or in the IC 531 Technical Manual. Always thin with clear water. DO NOT USE SOLVENTS.

While mixing, add Part 2, zinc dust, to Part 1, vehicle. DO NOT ADD VEHICLE TO ZINC DUST. After mixing pour the product through a 40 mesh screen into a pressure pot or second pail.

For mixing smaller amounts the weight ratio per gallon is 6.67 pounds of vehicle to 18 pounds of zinc dust.

APPLICATION

Hold gun at right angle to the surface and spray in even overlapping passes to assure an even wet film.

Avoid excessive build in corners by not spraying directly into corners. Allow the edge of the fan pattern ***to*** coat the corner. This will avoid mudcracking on hot steel.

Check dry film thickness with a guage when 531 is dry and hard. This occurs in about 30 minutes under most conditions.

SPECIAL CONDITIONS - **Under most conditions** 531 is dry and hard in 30 minutes. Cold, humid conditions can slow drying when the steel temperature is close to dew point. Both steel and ambient temperatures should be at a minimum 40°F and at least 5°F above the dew point.

TOUCH-UP - Brush or spray. Surface must be free of dust, dirt and organic contaminants. See Surface Preparation "Touch-UP" above.

CLEAN-UP - With fresh water immediately after use. Do not use solvents.

RECOMMENDED EQUIPMENT - See IC 531 Technical Manual.

TECHNICAL ASSISTANCE

Inorganic Coatings, Inc., will provide support and on-site training to all new customers, or by request. An IC 531 Technical Manual is provided to all new customers or upon request.

ORDER INFORMATION:

Write or Phone: Inorganic Coatings, Inc.
1 Great Valley Parkway
Malvern, PA 19355
(215)640-2880
(800) 345-0531 (USA)
(800) 522-0531 (PA)

SHIPPING INFORMATION:

Packaging: 4 gallon 2-Part Kit

Weight/Kit: 4 gallon - 101 lbs.

FOB Points: Albany, NY
Houston, TX

531
TEST DATA

TEST RESULTS WERE COMPILED FROM REP
BY DL LABORATORIES, SRI INTERNATIO
KTA TATOR LABORATORIES AND SEVERAL DOT'S.

COAT

1 coat 3 mil DFT minimum

CONDITION IN CONTAINER

Mixes easily
Does not liver
No apparent viscosity changes
No objectionable properties

APPLICATION CHARACTERISTICS

Readily applied by brush
Readily applied by spray
Leveling good
Intercoat adhesion - excellent

DRYING TIME

Between coats - 15 minutes
For service - 2 hours
To topcoat - 2 hours

ADHESION

Excellent

RECOATABILITY

Excellent

APPEARANCE OF COATING

Smooth

TOXICITY

No toxicological effect

HARDNESS

Excellent one half hour after applica

Tabor Abrator Test Results - CS 17 w
1000 grams weight at 1000 cycles

- 2 hours after application - weight loss .0573 grams
- 24 hours after application - weight loss .0462 grams; duplicate .0531 grams weight" loss

Coating thickness loss approximately 0.6mils OFT

FLEXIBILITY

Passes bend 180° over ½ inch mandrel

RESISTANCE TO AVIATION FUEL AND WATER AT 90°F

Change in appearance - none
Film failure - none
Loss of hardness - slight
Loss of adhesion with knife - slight

SALT FOG - 7000 HOURS

Rusting in scribe - none
Pinhole rusting - none.
Coating failure - none

FLASH POINT

None

PW20
EPOXY

IC PW 20 EPOXY IS A WATER-BASED, TRUE POLYAMIDE EPOXY FOR USE AS A MID-COAT OR TOPCOAT OVER IC 531 INORGANIC ZINC PRIMER

IC PW 20 EPOXY ADVANTAGES

CHEMICAL RESISTANCE - IC PW 20 *Epoxy* has many of the chemical resistant properties normally associated with solvent-based coatings. It has good resistance to dilute alkalis and dilute mineral acids.

ABRASION RESISTANCE - IC PW 20 Epoxy has a very hard finish and excellent abrasion resistance.

ANTI-CHALKING - IC PW 20 Epoxy has less tendancy to chalk than standard polyamide epoxies.

GRAFFITI RESISTANCE - IC PW 20 *Epoxy* can be formulated as a high-gloss topcoat for graffiti resistance. It is also available in matte and semi-gloss finishes.

SPECIFICATIONS

SOLIDS: 53% Weight
43% Volume

RECOMMENDED DRY FILM: 2-5 roils DFT

THEORETICAL COVERAGE:

3 mils DFT- 229 sq. ft./ gallon

APPLICATION TEMPERATURE:

Surface and ambient temperatures between 45°F and 100°F

VISCOSITY @ 70°F: 87-93 KU

DRYING TIME AT 70°F/BELOW 80% R.H.:

To Touch - 4 hours
To Recoat - 6 hours
To Handle - 12-16 hours

COLOR: Custom Colors, No Pure White

SHELF LIFE: 1 year minimum

POT LIFE: 3 hours

WEIGHT PER GALLON: 10 lbs.

Voc's: .5 lbs. per gallon

STORAGE: Between 45°F and 100°F

SURFACE PREPARATION

All surfaces should be IC 531 Primed, clean, dry, free of oil, dirt and other contaminants.

MIXING & THINNING

Add Part 2 Converter to Part 1 Base while mixing. Allow mixed product to stand for 30 minutes at 60°-80°F before use. Thinning is not normally necessary however if thinning is needed, thin up to 10% with a blend of 90% water/10% isopropal alcohol.

APPLICATION

Airless spray is recommended. When applying over IC 531 primer, apply mist coat followed by a full film build. Touch-up with brush or spray.

EQUIPMENT

Airless, Graco or equivalent 30:1, pump. Graco Silver Gun or equival with .021-.035 tip is recommended.

CLEAN-UP

Promptly with water.

SAFETY

This product contains solvents and other chemical ingredients. Healt safety precautions should be obser during storage, handling, use and periods. FOR BEST RESULTS AND SAF USAGE CONSULT THE MATERIAL SAFETY SHEET FOR THIS PRODUCT.

ORDER INFORMATION:

Write or Phone: Inorganic Coatings, Inc.
1 Great Valley Parkway
Malvern, PA 19355
1-800-345-0531
1-800-522-0531 (PA only)

Contact: Your local IC Sales Rep.

SHIPPING INFORMATION:

PACKAGING: 5 Gallons

WEIGHT PER 5 GALLON UNIT: 53 lbs

FOB POINT: Malvern, PA

46
ACRYLIC

IC 46 IS A HIGH BUILD, WATER-BASED ACRYLIC SPECIFICALLY FORMULATED FOR USE WITH IC 531 INORGANIC ZINC.

IC 46 ADVANTAGES

WATER-BASED, LOW VOC'S - Less than one pound per gallon VOC's.

HIGH BUILD/HIGH SOLIDS - Apply 3-4 roils dry film in a single applications. Higher solids than most acrylic finishes.

EXCELLENT WEATHERING - IC 46 resists fading and chalking and maintains gloss over many years.

CHEMICAL **RESISTANCE - Excellent** against acids, alkalis, solvents and salt spray.

FAST DRYING - Dries to tack free condition in 60 minutes. Exhibits excellent dry fall characteristics in spray applications.

SPECIFICATIONS

SOLIDS : 41% Volume

WEIGHT PER GALLON: 10 lbs.

DRY TIME AT 77°F:

To Recoat - 1 hour
To Handle - 6 hours

RECOMMENDED DFT: 3 roils

THEORETICAL COVERAGE:

3 mils DFT - 220 ft.^{2}/gallon

POT LIFE: **N/A**

GLOSS : Semi-gloss

COLORS : Custom Colors

SHELF LIFE: 1 year

Voc's: .67 lbs.per gallon
(Varies with color)

SURFACE PREPARATION

Steel surfaces should be IC 531 primed, clean, dry, free of oil, dirt and other contaminants. IC 46 should be applied over IC 46P midcoat. To use directly over IC 531 consult your IC sales representative.

MIXING AND THINNING

IC 46 is ready to use over IC 46P. Thinning is not recommended. If applying directly over IC 531 primer, two vials of activator should be thoroughly mixed into the product. Consult with your IC sales representative.

APPLICATION

Airless or conventional spray equipment is recommended to obtain high build characteristics. Brush or spray is recommended for touch-up. When applying over IC 531 primer, mist coat then follow by a full build.

DO NOT APPLY WHEN AIR OR SURFACE TEMPERATURE IS BELOW 60°F.

EQUIPMENT

Conventional or airless - Speefl or Graco 30:1 pump; .015-.025. orifice tip recommended. Clean pump before and after use with clean soapy water and rinse well.

SAFETY PRECAUTIONS

This product contains solvents and/or other chemical ingredier Adequate health and safety should be observed during a storage, handling, use and drying periods. FOR BEST AND AND SAFEST USAGE CONSULT THE MATERIAL SAFETY DATA SHEET FOR THIS **PRODUCT**.

ORDER INFORMATION:

Write or phone: Inorganic Coatings
1 Great Valley Pkwy.
Malvern, PA 19355
1-800-345-0531 (USA)
1-800-522-0531 (PA)

SHIPPING INFORMATION:

Packaging: 5 gallons

Shipping weight: 53 lbs. (5 ga

FOB **Points:** Malvern, PA
Houston, TX
Los Angeles, CA

46P ACRYLIC

IC 46P IS A WATER-BASED ACRYLIC SPECIFICALLY FORMULATED FOR USE WITH IC 531 INORGANIC ZINC

IC 46P ADVANTAGES

WATER-BASED, LOW VOC'S - Less than one pound per gallon VOC's.

FAST DRY AND RECOAT - IC 46P dries fast and can normally be topcoated in 1 hour. It also exhibits excellent dry fall characteristics in spray applications.

SPECIFICATIONS

SOLIDS : 41% Volume

WEIGHT PER GALLON: 10 lbs.

DRY TIME AT 77°F:

To Recoat - 1 hour

RECOMMENDED DFT: 2-3 roils

THEORETICAL COVERAGE:

2 roils DFT - 329 ft.^{2}/gallon

POT LIFE: 48 hours

GLOSS : Matte

COLOR : Buff

SHELF LIFE: 1 year

Voc's: .67 lbs. per gallon

SURFACE PREPARATION

Steel surfaces should be IC 531 = primed, clean, dry, free of oil, dirt and other contaminants.

MIXING AND THINNING

Mix both vials of the activator thoroughly into the five gallons of IC 46P. Thinning is not recommended. Pot life is 48 hours.

APPLICATION

Airless or conventional spray equipment is recommended to obtain high build characteristics. Brush or spray is recommended for touch-up. When applying over IC 531 primer, mist coat then follow by a full build.

DO NOT APPLY WHEN AIR OR SURFACE TEMPERATURE IS BELOW 60°F.

EQUIPMENT

Conventional or airless - Spe
or Graco 30:1 pump; .015-.025
orifice tip recommended. Cle
pump before and after use wit
clean soapy water and rinse
well.

SAFETY PRECAUTIONS

This product contains solvent
and/or other chemical ingredi
Adequate health and safety
should be observed during all
storage, handling, use and
drying periods. FOR BEST AND
AND SAFEST USAGE CONSULT THE MATERIAL SAFETY DATA SHEET FOR THIS PRODUCT.

ORDER INFORMATION:

Write or phone: **Inorganic Coatings**
1 Great Valley Pkwy.
Malvern, PA 19355
1-800-345-0531 **(USA)**
1-800-522-0531 (PA)

SHIPPING INFORMATION:

Packaging: 5 gallons

Shipping Weight: 53 lbs. (5

FOB Points: **Malvern, PA**
Houston, TX
Los Angeles, CA

64 URETHANE

IC 64 URETHANE ISA HIGH BUILD ACRYLIC URETHANE FORMULATED FOR USE AS A FINISH COAT OVER IC 531 PRIMER OR DIRECTLY OVER BLASTED STEEL

IC 64 ADVANTAGES

OC Compliance - IC 64 has only 2.96 lbs. OC's per gallon and is VOC compliant in cost areas.

Chemical Resistance - Excellent resistance solvents, acids, alkalies and salt.

durability and Abrasion Resistance - The thick hard film offers greater durability and abrasion resistance.

SPECIFICATIONS

SOLIDS: 60% Volume

Voc's: 2.96 1bs. per gallon

RECOMMENDED DFT: 6-8 roils DFT

THEORETICAL COVERAGE:

6 roils - 160 sq. ft./gallon

DRYING TIMES AT 75°F:

Set to touch	45 minutes
Dry to handle	6 hours

HEAT RESISTANCE: 300°F - Dry

GLOSS : High Gloss

THINNER: IC 14 Thinner

COMPONENTS: Two (2)

POT LIFE AT77°: 6 hours

STORAGE: Below 95°F

SHELF LIFE: 1 year minimum

FLASH POINT:

Part 1	- 72 ° F
Part 2	- 72°F

SURFACE PREPARATION

All steel surfaces should be primed with IC 531 inorganic zinc and must be clean, dry, free of grease, oil and other contaminants.

MIXING AND THINNING

While agitating, add Part 2 Activator to Part 1 Base. Product is ready to use immediately. Use IC. 164 Thinner as necessary.

APPLICATION

Apply by spray, brush for touch up only. When applying over IC 531, mist coat then follow by a full build coat to eliminate solvent bubbling.

Air Spray: DeVilbiss MBC-510 gun; E ti 64 air cap; 3/8" I.D. material hose; double regulated pressure tank with and moisture separator.

Airless Spray: Minimum 28:1 or 30:1 r pump; .015"-.019" orifice tip; 1/4" I.D. Teflon material hose.-

CLEAN-UP

Promptly with IC 164 Thinner.

SAFETY

This product and recommended thinner contains solvents aria/or other chemical ingredients. Adequate health and safety precautions should be observed during all storage, handling, use and drying periods. For best results and safest usage consult the current Material Safety Data Sheet for this product.

ORDER INFORMATION:

WRITE or PHONE: Inorganic Coatings, Inc.
1 Great Valley Parkway
Suite 8
Malvern, PA 19355
1-800-345-0531
1-800-522-0531 (PA only)

CONTACT: Your local IC Sales Rep.

SHIPPING INFORMATION:

PACKAGING: 5 Gallons

WEIGHT PER 5 GALLON UNIT: 65 lbs.

FOB POINT: Houston, TX

P24 EPOXY

IC P24 IS A HIGH BUILD POLYAMIDE CURED EPOXY **FOR USE AS A FINISH COAT OVER** IC 531.

IC P24 ADVANTAGES

CHEMICAL RESISTANCE - Excellent against acids, alkalis and water. Good resistance to solvents.

HARD FINISH - The IC P24 finish has excellent resistance to wear and abrasion.

COLORS - IC P24 is available in white. ready mix and custom colors.

SPECIFICATIONS

SOLIDS: 75% volume

RECOMMENDED DRY FILM: 5 roils OFT

DRY TIME AT 60°-80°F

To touch - 2 hours
To recoat - 8 hours

THEORETICAL COVERAGE:

5 roils OFT - 240 square feet/gallon

POT LIFE AT 60°-80°F: 8 hours

FLASH POINT: 60°F (P.M.C.C.)

SHELF LIFE: 1 year minimum

COLORS: White, ready-mix and custom colors

GLOSS : Semi Gloss

Inorganic Coatings, Inc., 1 Great Valley Parkway, Suite 8, Maivern, PA 19355 215 640 2880

SURFACE PREPARATION

Steel surface should be IC **531** primed and tiecoated, free from moisture, grease or other contaminants.

MIXING

After mixing base portion, add 1 part converter to 1 part base while continuing to mix. Thin, if necessary for spraying, a maximum of 10% with IC 124 thinner.

APPLICATION

Conventional or airless spray recommended to achieve film build. Roller or brush may be used for touch-up or when spray is not practical. Relative humidity should be below 85% and a minimum temperature of 50° is required for cure within a practical time limit.

EQUIPMENT

Airless - Graco or equivalent 30:1 pump, 208-663 silver gun with .021 orifice and 3/8 inch fluid hose.

Conventional - DeVilbiss MBC 510 gun E needle and tip, #704 aircap or equivalent.

May be brush or roller applied however spray is recommended for proper film build.

SAFETY PRECAUTIONS

WARNING! FLAMMABLE! Keep away from heat and open flame. Avoid breathin of vapor, eye and skin contact.

See label for additional safety information.

ORDER INFORMATION:

Write or Phone: Inorganic Coatings, Inc.
1 Great Valley Parkway
Suite 8
Malvern, PA 19355
. (215) 648-3990

Contact: Your local IC Sales Rep.

SHIPPING INFORMATION:

PACKAGING : 10 Gallons (2 parts)

WEIGHT PER 10 GALLON UNIT: 119 lbs.

FOB POINTS: Malvern, PA
Houston, TX
Los Angeles, CA

P25
ALL TEMP-EPOXY

IC P25 IS A POLYAMIDE-CURED, HIGH-BUILD, INTERMEDIATE/ FINISH COAT FOR USE OVER IC 531 INORGANIC ZINC

P25 ADVANTAGES

ALL TEMPERATURE CURE - P25 cures with proper handling down to 0°F.

HIGH PRODUCTION - P25 fast cure al lows rapid recoat and high production throughput.

HARD FINISH - The P25 finish has excellent resistance to wear and abrasion.

CHEMICAL RESISTANCE - P25 has excellent resistance to acids, alkalies and water. Good resistance to solvents.

SPECIFICATIONS

SOLIDS: 50% volume

RECOMMENDED DRY FILM:

3-5 mils DFT per coat

DRY TIME AT 70°-90°F:

To touch - 1 hour
To recoat - 5 hours
See over for cold temperature application

THEORETICAL COVERAGE:

3 mils DFT - 265 square feet/gallon

POT LIFE AT 70°-90°F: 4 hours

FLASH POINT: Base - 87°F (P. M. C. C.)
Converter - 44°F (P.M. C. C.)
Mixed - 55°F (P. M. C. C.)

SHELF LIFE: 1 year minimum when stored at 40°F-100°F

COLOR : Off-white and tints

THINNER: IC 125

GLOSS: Flat,

SURFACE PREPARATION

Minimum "commercial" SSPC SP-6 blast and prime coat of IC 531 inorganic zinc. Zinc prime surface must be clean, dry, free of oil, dirt and other contaminants.

MIXING & THINNING

1. Thoroughly agitate Base and Converter separately.
2. Mix complete contents of each, Base and Converter and agitate thoroughly.
3. Allow to stand 60 minutes when material temperature is below 70°F.
4. Material normally needs no thinning. If thinning is necessary, below 60°F use IC 125 thinner; above 60°F use IC 225 thinner. Use up to ½ pint per gallon.

APPLICATION

Airless, Conventional spray or brush. Touch-up with brush or spray. Strain material before application.

EQUIPMENT.

Airless: Graco or equivalent 30:1, 40:1 pump, Graco silver gun or equivalent with .015-.019 tip, 1/4" IC Teflon material hose.
Conventional: DeVilbiss MBC-510 Gun: E tip and 704 air cap; 3/8" ID material hose.

CLEAN-UP

Clean up promptly with IC 125 Thinner or ketone solvents. Do not allow material to remain in lines during breaks. Flush with thinner.

COLD TEMPERATURE APPLICATION

For best application properties bring material to 70°-80°F prior to mixing a spraying. For 0°F-40°F application-in mediate coat should be topcoated withi 24 hours. The system should then be p tected from the environment for two we
Drying time @ 0°F-35°F: To touch - 5 h
To recoat - 18

SAFETY PRECAUTIONS

WARNING! FLAMMABLE! Vapor harmful. May cause irritation. Avoid breathing vapor or spray mist and contact with e and skin. Use adequate ventilation. See Material Safety Data Sheet.

Read cautions on-converter label. Plea observe all precautions.

ORDER INFORMATION:

Write or Phone: Inorganic Coatings, Inc.
5 Great Valley Parkway
Suite 280
Malvern, PA 19355
(215) 648-3990

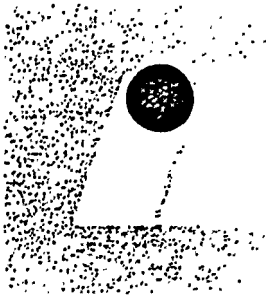
Contact: Your local IC Sales Rep.

SHIPPING INFORMATION:

PACKAGING: 10 Gallons - Base: 5 Gallon
Converter: 5 G

WEIGHT PER 10 GALLON UNIT: 125.1 lbs.

FOB POINTS: Louisville, KY
Houston, TX
Baltimore, MD
Emeryville, CA



A26
EPOXY

- IC A26 IS AN AMINE CURED, HIGH BUILD EPOXY , USE A26 OVER IC 531 INORGANIC ZINC, AS A HIGH BUILD, FAST CURE TIECOAT, OR APPLY 2 COATS FOR A COMPLETE 3 COAT SYSTEM, CURES AT TEMPERATURES DOWN TO 25°F,

A26 ADVANTAGES

FAST CURE - IC A26 may be recoated in just 4 hours at 60°-90°F. Will **cure** at low temperatures down to 25°F.

HIGH ADHESION to IC 531 zinc primer or directly to hand-cleaned or better steel surface.

CHEMICAL RESISTANCE - excellent against alkalis, chlorides and water.

HIGH BUILD - IC A26 can be applied to 8 roils DFT per coat.

SPECIFICATION

SOLIDS: 65.0% volume
78.5% weight

DRY TIME AT 60°-90°F:

To touch - 1 hour
To recoat - 4 hours

. THEORETICAL COVERAGE:

4 mils DFT- 260 square feet/gallon
6 mils DFT- 170 square feet/gallon
8 mils DFT - 130 square feet/gallon

POT LIFE: At 60°-80°F - 4 hours

THINNER: IC 121

FLASH POINT: 100°F (P.M.C.C.)

SHELF LIFE: 1 year minimum

COLORS: White, Light Gray, Medium Gray, Brown

GLOSS : Matte (35 units at 60°)

InorgnicCoatings,Inc., **1GreatValleyParkway,Suite8,Malvern, PA 19355** **2156402880**

SURFACE PREPARATION

All surfaces must be clean, dry, free of oil, dirt and other contaminants. When possible we always recommend a minimum SSPC SP-6 blast and prime with IC 531 inorganic zinc. when this grade of surface preparation is not possible, IC A26 epoxy may be applied directly to a minimum SSPC SP-2, hand tool cleaned steel.

MIXING AND THINNING.

Add 1 part converter to 4 parts base, mix thoroughly and allow to stand 30 minutes at 60°-90°F before use. When applying directly to steel surface, thin 20% with IC 121 thinner.

APPLICATION

Airless or conventional spray. Touch-up with brush or spray. When applying over IC 531 inorganic zinc a mist coat followed by a full build coat will eliminate potential solvent bubbling.

EQUIPMENT

Airless, Graco or equivalent 30:1, 40:1 pump. Graco Silver Gun or equivalent with .021-.035 tip recommended.

CLEAN-UP

Promptly with IC 121 Thinner.

SAFETY PRECAUTIONS

WARNING! FLAMMABLE! Vapor harmful. May cause irritation. Avoid breat . vapor or spray mist and. contact with eyes and skin. Use adequate ventilati Contains xy101 and methyl-n-amyl ket

FIRST AID: In case of contact with eyes or skin, flush with fresh water f 15 minutes and get medical attention. If swallowed, CALL A PHYSICIAN IMMEDI DO NOT INDUCE VOMITING. Read caution converter label. Please observe precautions.

Inorganic Coatings, Inc. warrants that me product meets specifications but disclaims all other warranties relating to the product and its application, express or implied. Receipt of products from Inorganic Coatings, Inc. constitutes acceptance of the terms of this warranty. Inorganic Coatings, Inc. will not be responsible or liable for consequential damage except as liability is mandated by law.

ORDER INFORMATION:

Write or Phone: Inorqanic Coatings, Inc.
5 Great Valley Parkway
Suite 280
Malvern, PA 19355
(21 5) 648-3990

. Contact: Your local IC Sales Representative

SHIPPING INFORMATION:

PACKAGING: 5 Gallons

WEIGHT PER 5 GALLON UNIT: 65 lbs.

FOB POINTS: Pennsauken, NJ
Indianapolis, IN
Baton Rouge, LA
Houston, TX
Riverside, CA

JOTUN VALSPAR

1401 SEVERN STREET

BALTIMORE, MARYLAND 21230

(161)

VOLATILE ORGANIC COMPOUNDS — V.O.C.

Numerous questions have arisen as to which products in our current product line have a VOC of less than 420 gra (3.5 lbs./gal.). The following is a list of our existing products with a VOC at or below 420 grams/liter. For multi-com items, the mixed VOC is indicated.

Product Number	Description	VOC gms/ltr	lbs/g
13-F-1	Valspar MZ-1 Inorganic Zinc Rich	000	0.0
13-F-2	Valspar MZ-2 Organic Zinc Rich	414	3.4
58A5000	Long Life Anti-Fouling	416	3.4
65-F-15	Sovapon Hi-Build Epoxy	395	3.3
65-R-10	Sovapon Hi-Build Epoxy	395	3.3
116EO	Coal Tar Epoxy	234	2.0
116ER	Coal Tar Epoxy	262	2.2
264-D-2	Sovapon Tank Coating (Low V.O.C.)	226	1.1
264-F-101	Sovapon Hi-Flash Hi-Solids Tank Coating	127	1.6
264-W-2	Sovapon Tank Coating (Low V.O.C.)	226	1.9
364-W-101	Sovapon Hi-Flash Hi-Solids Tank Coating	127	1.1
513-R-1	Red Lead Oxide	284	2.4
529-F-1	Equipment Enamel	385	3.2
529-W-2	Enamel, Interior and Exterior	389	3.3
553-R-3	Primer, Alkyd Red Lead	388	3.2
558-F-1	Enamel, Exterior Deck	380	3.2
558-F-2	Paint, Deck Gray	399	3.3
558-R-1	Paint, Deck Interior	397	3.3
559-J-6	Vinyl Anti-Fouling	339	2.8
559-J-8	Vinyl Anti-Fouling	342	2.9
559-R-8	Vinyl Anti-Fouling	328	2.7
561-W-1	Enamel, Silicone Alkyd	399	3.3
569-R-1	Vinyl Anti-Fouling	328	2.7
575-W-1	Chlorinated Alkyd Enamel	375	3.1
589-F-1	Epoxy Polyamid	371	3.1
589-F-3	Epoxy Polyamid	376	3.2
589-F-8	Epoxy Polyamid	375	3.2
589-G-1	Epoxy Polyamid	352	3.0
589-J-1	Epoxy Polyamid	373	3.1
589-R-1	Epoxy Polyamid	323	2.7
589-W-1	Epoxy Polyamid	372	3.1
1161	Chromoprime	411	3.4
1209	Hi-Hide White	359	3.0
1210	White-Blue Tone	359	3.0

Jotun Valspar

Protective Coatings

BULLETIN JV-2

Product Number	Description	VOC gms/ltr	VOC lbs/gal
1253	Red Lead Quick Dry	407	3.4
1260	Conventional Anti-Fouling	290	2.4
1350	Ballastic	325	2.7
1452	Pilot I Flat White	400	3.3
2497	Safeguard	319	2.7
2498	Safeguard	319	2.7
2501	Jotamastic 87 Aluminum	249	2.1
2502	Jotamastic 87 Green	236	2.0
2503	Jotamastic 87 Red	236	2.0
2504	Jotamastic 87 Gray	236	2.0
2505	Jotamastic 87 Cream	236	2.0
3240	Wetsall Primer	406	3.4
3241	Wetsall Primer	406	3.4
4098	Baltoflake	000	0.0
8199	Ballastite 300	5	0.1
8250	Ballastite 500	320	2.7

Jotun Valspar

Marine Coatings

1401 Severn Street
Baltimore, MD 21230

(301) 625-7200

1-800-638-7756

TELEX: 6849014 FAX: (301) 332-0202

SHERWIN-WILLIAMS COMPANY

269 GREAT VALLEY PARKWAY

MALVERN, PA 19355

INDUSTRIAL MAINTENANCE
VOC COMPLIANT COATINGS (420 gms/liter)

Coal Tar Epoxy C200, B69B50/B60V50
Direct-to-Metal Enamel, B55 series
Dryfall Finish B48W60
DTM Acrylic Gloss (also meets architectural 250 rule), B66 series
Super Save-Lite Dryfalls B48W61, B47W62
Epoxy Mastic Aluminum, B62S10/B60Vll
Epoxy Mastic Coating, B58 series
Heavy Duty Block Filler (also meets architectural 250 rule), B42W46
Heavy Duty Epoxy, B67/B60V3 series
Hi Solids Catalyzed Epoxy, B62W201 series/B60V20
Industrial Aluminum (Exempt), B59S4
Industrial Enamel VOC Complying, B54Wz series
Industrial Water Based Acrylic Paint (also meets architectural 250 rule), B42W11O
Kern Cati Coat Epoxy Filler/Sealer, B42WA8/B42WA9
Kern Kromik Universal Metal Primer (VOC Complying), B50NZ6
Kromik Metal Primer, E41N1
Latex Metal Primer (also meets architectural 250 rule), B42N8
Metalatex Semi-GLoss (also meets. architectural 250 rule), B42 series
Rexthane (Exempt), B44V20
Set Fast Waterborne Traffic Paint, TM 226, TM 225, TM 286, TM 287, TM 289
Sher Tar HI Mil/Epoxy, B69B40/B60V40
Silicone Alkyd Enamel, B56 series
Silver Brite (Exempt - All), B59S2, B59S3, B59S8, B59S11, B59SW2, B59SW1
Tile Clad II HI Bild Primer,B62N71/B60V70

PORTER PAINT COMPANY

400 SOUTH 13th STREET

LOUISVILLE, KY 40203

Generic Type	Company Designation	VOC Content*	Cost Relative to Non-Complying Solvents	Availability	History In Marine Service (Yes or No)
cy Primer mido-amine)	Magna-Prime (7500)	1.78 lbs/gal		Immediate	
cy Zinc Primer (amido-amine)	Magna-Zinc (325)	2.01 lbs/gal		"	
ace Tolerant Epoxy mido-amine)	Magna-Mastic (7900)	0.09		"	
cy Primer/Finish (amido-amine)	Magna-Glass (7750)	0.06		"	
Tar Epoxy olyamine)	Tarset Super (1332)	1.76		"	
Tar Epoxy mine)	Tarset Standard (7001)	2.39		"	
Tar Epoxy olyamide)	Tarset Maxi-Build (7080)	2.2		"	"
Tar Epoxy olyamide)	Tarset C-200 (7013)	1.71		"	"
Tar Epoxy polyamide)	Tarset Wintercure (7090)	2.29		"	
Solids Epoxy Polyamine)	M.C.R.-65 H.S. (6510)	1.28		"	
Solids Epoxy Polyamine)	Tile-8 (67 solids)	1.64		"	
cy H.B. Topcoat mide-amine)	Magna-Coat (7510)	1.78		"	
ylil Polyurethane (aliphatic polyurethane)	Hythane Ultra (8731)	2.2		"	
% solids floor coating (Acrylic)	Perma-Lock (2350N)	0.0		"	
ble tank lining epoxy mide-amine)	Magna-Line (7530)	1.78		"	
norganic Zinc Primer	Zinclad 371	*Excludes Water, See Reg 8, Rule 43 0.0		"	
[illegible] Finish	[illegible]				